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This guide outlines the features of the OnApp 6.1 cloud hosting engine. It describes the basics of the engine architecture and explains how to create virtual machines and work with OnApp.

The OnApp User Guide includes the following chapters:

1. **Document Conventions** - describes the formatting conventions used in this guide.
2. **Default Permissions for User Role** - covers the list of default permissions set for the user role.
4. **Control Panel Overview** - familiarizes with the OnApp Control Panel Dashboard and briefs you on how you can deal with User Profile.
5. **Appliances** - describes the utilization of virtual and physical devices that can be provisioned in the cloud.
6. **Templates** - provides details on what an OnApp template is, types of templates, as well as how you can create a custom template and build a VS based on it. Besides, it includes ISOs chapter, which describes how to upload your custom bootable ISOs for recovery purposes.
7. **Recipes** - describes the use if recipes for adding new functionalities to the cloud.
8. **AWS** - describes possibility to manage Amazon EC2 instances from OnApp Control Panel using AWS API.
10. **Groups** - provides an overview of the organization of the OnApp users into user groups.
11. **Logs** - provides the list of transactions available with OnApp and tells how to view them.
12. **Statistics** - outlines the statistics on the resources used by your virtual machines.
13. **Buckets** - familiarizes with the OnApp billing system and explains how the base resource limits and prices are set in the Control Panel.

This guide describes the OnApp Cloud functionalities available for the user with the default **User** role permissions. Users are created by administrators and only have access to those actions which are specified by the administrator. Cloud administrator may edit permissions for the **User** role, therefore the availability of some features may vary. Contact your administrator for more information.
1 Document Revisions

OnApp 6.1 Stable
- Updated Migrate Disks: added a note with a recommendation to create a disk backup before starting the disk migration process.

OnApp 6.1 Edge 2
- Updated Migrate Virtual Server with adding information about the following:
  - possibility to migrate a virtual server NIC to a network that is not associated with a source compute resource during hot and cold migration
  - possibility to use backup IP addresses as an alternative network for traffic during hot and full hot VS migration
- Updated Virtual Routers: added info about the possibility to confirm or cancel converting virtual servers to virtual routers with the confirmation dialog box.

OnApp 6.1 Edge 1
- Added the Virtual Server Wizard Beta chapter.
- Added the Clone Virtual Server section.
- Updated Manage ISO Virtual Servers: added information about the possibility to clone virtual servers.
- Added information about a noVNC integrated console to the following docs:
  - Virtual Server Integrated Console
  - Smart Server Integrated Console
  - Container Server Integrated Console
- Added information about managing external IP addresses via API to the following docs:
  - Virtual Server IP Addresses
  - View Virtual Server Details
- Added information about the possibility to trigger recipes to add/remove IP address for a virtual server to the following docs:
  - Virtual Server Recipes
  - Smart Server Recipes
  - Container Server Recipes
- Updated Create Custom Virtual Server Beta2: added information that you can disable the swap disk creation.
- Updated Create Load Balancer Cluster: added information about the possibility to set and edit CPU priority for load balancers.

OnApp 6.0
- Updated Logs: added information about filtering logs based on the Cancelled status.

OnApp 5.10
- Added information about downloading a CSV file with billing statistics to the following docs:
  - Virtual Server Billing Statistics
  - User Billing Statistics

OnApp 5.9
- Updated Cloud Usage: added information on about downloading a CSV file with cloud statistics.

- Removed information about CentOS 5 support from the following docs:
  - Create Virtual Server
  - Create Smart Server
  - Create Container Server
  - Create ISO Virtual Server
  - Create VMware Virtual Server
  - Templates
  - Compute Resource Matrix

- Updated the following documents with information on how to force a backup restore and rebuild a file system on a disk:
  - Restore Virtual Server Backup
  - Restore Smart Server Backup

OnApp 5.8
- Updated User Profile and View User Account Details: added information on OVAs Count.

- Updated Cloud Usage: added information on the statistics generation for the specified time period.

- Updated Migrate Virtual Server and Migrate Disks: added information on hot migration.

- Updated Create Virtual Server and Edit Virtual Server: added infobox on setting the correct amount of CPU sockets.

- Updated the following documents with an infobox that to run a backup schedule with the failed status once again users need to select the Enabled option during the schedule editing:
  - Edit Virtual Server Backup Schedule
  - ISO Virtual Server Backup Schedule
  - Container Server Backup Schedule
  - Edit Smart Server Backup Schedule

- Updated the following documents with information on the possibility to simultaneously power on/off all virtual servers that run on the same compute resource:
  - Virtual Server Power Options
  - View Compute Resources
  - View Compute Resource Details

OnApp 5.6
- Updated Logs and View Compute Resource Details sections: added information on the target ID.

- Replaced Hostname parameter with FQDN parameter on VS overview page in the following docs:
  - View Virtual Server Details
  - View Container Server Details
  - View VMware Virtual Server Details
  - View Smart Server Details
OnApp Cloud 6.1 User Guide

- View Baremetal Server Details

- Updated View Virtual Server Details, View Smart Server Details, View Baremetal Server Details, View Container Server Details, View VMware Virtual Server Details, and View Load Balancer Details sections: changed the Price per hour parameter to Estimated price per hour.

- Updated the User Profile and View User Account Details sections: updated the description of the Total cost parameter, added Total cost with discount and Discount due to free parameters.

- Updated Create User Group section: added information on buckets.

**OnApp 5.5**

- Updated Manage ISO Virtual Servers section: added prerequisite for hot migration of ISO virtual server.

- Updated User Profile and Default Permissions for User Role sections: added information about service insertion framework.

- Updated Purge Content and Prefetch Content sections: added ability to view statuses of transactions.

**OnApp 5.4**

- Added Visitors Report section

- Added Assign Disk to VS section

- Added Container Server Backups and Container Server Backup Schedules sections

- Added ISO Virtual Server Backups and ISO Virtual Server Backup Schedules section

- Added domain field in the creation wizard to the following docs:
  - Create Virtual Server
  - Create ISO Virtual Server
  - Create Smart Server
  - Create Baremetal Server
  - Create Container Server

- Updated Default Permissions for User Role section: added Assign own disk to VS permission.

- Updated ISO Virtual Servers and View Container Server Details sections: added information on the Auto-backup slider.

- Updated Migrate Virtual Server section: added ability to cold migrate a VS together with disks to another compute zone.

- Updated Create Virtual Server and Create ISO Virtual Server sections: changed the templates’ section design.

- Updated Your Notifications section: now your notifications are displayed as a bell at the top of the page.

**OnApp 5.3**

- Added Service Catalog section

- Updated View Container Server Details section: added information about login credentials.

**OnApp 5.2**

- Added Your Notifications section

- Updated Default Permissions for User Role section: added Messaging related permissions.
• Updated Add Disks to Virtual Servers section: added prerequisite for disk hot attach option.

OnApp 5.1
• Added Container Servers chapter
• Control Panel's Roles&Sets and Users&Groups menu now are split into separate sections - Users, Groups, Roles, and Sets.
• Updated Edit Virtual Server Disks section: added warning about cancelling disk resize transaction.
• Updated Create Custom Templates section: added info about error message during converting backup into template.
• Updated Default Permissions for User Role section: added container server related permissions.

OnApp 5.0
• Updated Create Virtual Server, Create ISO Virtual Server, Create Smart Server, Create Baremetal Server sections: added information about VS summary at the confirmation step of creation wizard; added password auto-generation if password field is left blank.
• Updated Create Smart Server, Create Baremetal Server sections: compute resource and compute zone steps are moved from properties to resource step in creation wizard.

OnApp 4.3
The following terminology changes have been made in the 4.3 version of the OnApp Cloud: instance types have been renamed as instance packages.

OnApp 4.2
• Updated Create Virtual Server section
• Updated Create Smart Server section
• Updated User Profile section
• Updated Default Permissions for User Role section
• Updated Virtual Server Transactions and Logs section
• Updated View Compute Resources section
• Updated Virtual Server Backups section
• Updated Smart Server Backups section
• Updated View Virtual Servers section
• Updated View Virtual Server Details section
• Updated View Compute Resource Details section
• Updated Edit Virtual Server Disks section
• Updated Autoscale Virtual Server and Autoscale Smart Server sections

OnApp 4.1
August, 2015
• Added Raw Logs section
• Updated Delete Virtual Server section
• Updated User Profile section
• Updated View User Account Details section
• Updated Step 3 of 6. Virtual Server Properties section
• Updated Edit Virtual Server section
• Updated Create Smart Server section
• Updated Edit Smart Server section

OnApp 4.0
April, 2015
• Added Step 1 of 6. Cloud Locations section
• Added ISOs chapter
• Updated Default Permissions for User Role section

OnApp 3.5
March, 2015
• Added AWS chapter
• Updated User Profile section
• Updated User Billing Statistics section
• Updated Default Permissions for User Role
2 Document Conventions

The following document conventions are used in this guide.

**Bold**
Label or button names in the Control Panel, often clickable. For example:
On the VS’s screen, click the **Tools** button, then select **Delete Virtual Server**.

**Italics**
Parameters and field labels in the UI. For example:
*Password* - set password for remote Vyatta management.

**Code block**
Source code. For example:
```
alter if not: eth0 = public interface
          eth1 = CP Communication interface
          eth2 = VLAN communication interface
```

In some cases, code examples can be preformatted. For example:
Run the following commands:
```
echo "cp <LOCATION OF vnc.xml> /etc/vmware/firewall/vnc.xml" >> /etc/rc.local

echo "localcli network firewall refresh" >> /etc/rc.local

echo "esxcli network firewall refresh" >> /etc/rc.local
```

**A menu selection**
For example:
Go to **Settings -> Networks -> Add New Network**

We use the following formatting elements to draw your attention to certain pieces of information:

**Info**
An info message emphasizes or explains the information within the chapter.

> Clicking the OFF button performs graceful shutdown and then powers off the VS after the timeout set in the **Configuration** settings.

**Note**
A Note message contains information essential for the task completion.

> The maximum length of a Mount Point is 256 characters.

**Warning**
A warning message informs you of something you should not do or be cautious.

> You won’t be able to restore a VS after deleting it.
3 Default Permissions for User Role

The list below includes the set of default permissions for the User role.

Activity Logs
- See details of own activity log - the user can only see the details of their own activity log

Backups
- Convert own backup to template - the user can only convert their own backups to templates
- Create backup for own VS - the user can only create backups of their own virtual servers
- Destroy own backup - the user can only delete their own backups
- See own backups - the user can only see their own backups
- Update own backup - the user can only edit their own backups

Buckets
- See own bucket - the user can see their own bucket

Container Servers
- Build/rebuild user's own container server - the user can build/rebuild his own container server
- Console to own container server - the user can only access their own container server via console
- Create a new container server - the user can create a new container server
- Destroy own container servers - the user can destroy own container servers
- Edit own container server's cloud config - the user can only edit their own container server's cloud config
- Migrate own container servers - the user can migrate own container servers
- Any power action on own container servers - the user can take any power-related action on own container servers
- See own container servers - the user can see own container servers
- Read own container server's root password - the user can read own container server's root password
- Rebuild network of own container server - the user can only rebuild network of own container server
- Manage recipes joins for own container servers - the user can manage recipes joins for own container servers
- Reset root password to own container server - the user can only reset the root password for their own container servers
- Update own container servers - the user can update own container servers

Dashboard
- Show cloud dashboard - the user can see the cloud details on the dashboard

Data Stores
- See all data stores - the user can see all data stores
Disks
- *Auto-backup for own disk* - the user can only schedule automatic backups on their own disks
- *Assign own disk to VS* - the user can assign own disks to another own VS
- *Create a new disk* - the user can create a new disk
- *Destroy own disk* - the user can only delete their own disks
- *See own disks* - the user can only see their own disks
- *Unlock any disk* - the user can unlock any disk
- *Update own disk* - the user can only edit their own disks

Edge Groups
- *See all edge groups* - the user can see all edge groups

Firewall Rules
- *Create own Firewall Rules* - the user can only create own firewall rules
- *Destroy own Firewall Rules* - the user can only delete own firewall rules
- *Read own Firewall Rules* - the user can only read own firewall rules
- *Update own Firewall Rules* - the user can only edit own firewall rules

Groups
- *See all groups* - the user can see all groups

Compute Resources
- *See all compute resources* - the user can see all compute resources
- *Show compute resources on Virtual Server creation* - display compute resources on Add New Virtual Server screen

Template Groups
- *See details of any template group* (image_template_groups.read) - the user can view template group details

IO Statistics
- *See own IO Statistics* - the user can see own IO Statistics

Virtual Server's IP Addresses
- *Add IP address to own virtual server* - the user can only add IP addresses to their own virtual servers
- *Remove IP address from own virtual server* - the user can only remove IP addresses from their own virtual servers
- *See IP addresses assigned to any virtual servers* - the user can only see IP addresses assigned to their own virtual servers

IP Addresses
- *See all IP addresses* - the user can see all IP addresses

IP Nets
- *View IP Nets assigned to any network* - the user can see IP Nets assigned to any network

IP Ranges
• View IP Ranges assigned to any IP Net - the user can see IP Ranges assigned to any IP Net

ISOs
• Read all public ISOs - the user can view public ISOs

Load Balancers
• Migrate own load balancer - the user can only migrate their own load balancer

Load Balancing Clusters
• Create new load balancing cluster - the user can create a new load balancing cluster
• Delete own load balancing cluster - the user can only delete own load balancing clusters
• See details of own load balancing cluster - the user can only see details of own load balancing cluster
• Change own load balancing cluster - the user can only change own load balancing cluster

Log Items
• Delete own log item - the user can only delete their own log items
• See list of own log items - the user can only see their own log items
• See details of own log item - the user can only see details of their own log items

Messaging: Notifications
• See own notifications - the user can see own notifications

Monthly Billing Statistics
• See only own Monthly Bills Statistics - the user can only see own monthly bills statistics

Nameservers
• See all nameservers - the user can see all nameservers

Networks
• See all networks - the user can see all networks

Payments
• See own user payments - the user can only see their own user payments

Recipes
• Create Recipes - the user can add new recipes
• Delete own Recipes - the user can delete own recipes
• Edit own Recipes - the user can edit own recipes
• Read own Recipes - the user can view own recipes

Recipe Groups
• See list of recipe groups - the user can view the list of recipe groups
• Read recipe groups - the user can view recipe group details

Recipe Group Relations
• See list of recipe group relations - the user can view the list of recipe group relations
- Read recipe group relations - the user can view recipe group relation details

Roles
- See user's own roles - the user can see only roles assigned to him.

Service Catalog
- Any action related to service catalog - user can take any action related to the service catalog

Service Insertion Framework
- See all Service Insertion Groups - the user can view all service insertion groups
- See all Service Insertion Pages - the user can view all service insertion pages

Templates
- Manage own templates - the user can create and manage their own templates
- See all public templates - the user can see all public templates

Transactions
- Delete own transactions from logs - the user can only delete their own transactions from a log
- See list of own transactions - the user can only see their own transactions
- See details of own transactions - the user can only see details of their own transactions

Users
- Change own password - the user can only change own password
- See own users - the user can only see their own user account
- See user backups/templates prices - the user can see users’ backups/templates prices
- See user bucket - the user can see users’ buckets
- See user hourly prices - the user can see users’ hourly prices
- See user monthly prices - the user can see users’ monthly prices
- See user outstanding amount - the user can see users’ outstanding amount
- See user summary payments - the user can see user’s summary payments
- See user virtual server prices - the user can see users’ virtual server prices
- Update own user - the user can only edit their own user account
- Generate own API key - the user can only generate own key
- Update own Yubikey - the user can modify their own Yubikey

Virtual Server Snapshots
- Create or restore own virtual server snapshot - the user can create/restore own snapshots
- Destroy own virtual server snapshot - the user can delete own snapshots
- See own virtual server snapshots - the user can see the list of own snapshots

Virtual Servers
- Manage publications for all virtual servers - the user can manage publications for all virtual servers
- Migrate own virtual server - the user can only migrate their own virtual servers
• Any power action on own virtual servers - the user can only take power-related actions on their own virtual servers

• Read Virtual Server’s root password - the user can read Virtual Server's root password

• Rebuild network of own virtual server - the user can only rebuild network of own virtual server

• Manage recipes joins for own virtual servers - the user can manage recipe joins for own virtual servers

• Reset root password of own virtual server - the user can only reset the root password of their own virtual servers

• Select resources manually on virtual server creation - the user can select resources while creating virtual servers

• Update own virtual server - the user can only edit their own virtual servers

• See own virtual machine statistics - the user can only see statistics for their virtual machines
OnApp Basics

The OnApp cloud hosting engine enables hosting providers to set up and manage private and public cloud servers, and virtual servers, quickly and easily using commodity hardware.

Basically, virtualization is the partitioning of a physical server into smaller virtual servers. Through a user-friendly Control Panel, you can deploy virtual machines running different operating systems and their applications on the same hardware at the same time, dynamically allocate resources, deploy services, save on resource consumption, and much more.

With flexible control of your cloud environment, OnApp lets you make best use of your hardware and create efficient, cost-effective server clusters for development, staging, and production environments.

4.1 Main Components & Features

OnApp Cloud handles cloud deployment, VS deployment, VS management & resource allocation, compute resource and SAN management, failover, user management, billing, self-provisioning, CDN and DNS, and other associated functions. Here’s a brief description of the main components and features of the OnApp installation:

4.1.1 Servers

There are two required server types in an OnApp configuration – compute resource servers and the Control Panel server. OnApp also requires storage devices for templates, virtual servers and backups.

4.1.1.1 Control Panel Server

The Control Panel server (sometimes known as the Base server) hosts the OnApp user interface and manages all the processes controller by OnApp.

The Control Panel server:

- Provides a web-based user interface
- Assigns a virtual server to a compute resource
- Creates/starts/stops/deletes virtual servers
- Resizes CPU and storage
- Manages virtual servers through a console session
- Creates backups of virtual servers
- Allows virtual servers to be restored from a backup
- Allows the creation of custom templates from virtual server backups, for future deployment of new virtual servers
- Displays your CPU usage and network utilization

4.1.1.2 Compute Resources

Compute resources are Xen, KVM, or VMware ESXi/vSphere 5.0 -powered servers running on bare metal, with CentOS Linux as the management operating system. This ensures highly efficient use of available hardware, and complete isolation of virtual server processes. The management OS controls virtual servers as well as handling network/disk connectivity, monitoring, IP address anti-spoofing and more.

Compute resources:

- Provide system resources such as CPU, memory, and network
- Control the virtual differentiation of entities such as virtual servers and application data being delivered to cloud-hosted applications
- Take care of secure virtualization and channeling of storage, data communications and server processing
- Can be located in different geographical zones
- Can have different CPU and RAM

OnApp Cloud supports three compute resource virtualization platforms:
- Xen - OnApp supports Xen 3 and Xen 4
- KVM
- VMware

VMware compute resources operate in a slightly different way. With Xen/KVM OnApp controls compute resources directly. With VMware, OnApp controls the VMware vCenter. This allows vCenter to control the VSs with the full range of VMware functionality including DRS and vMotion to ensure that the operation is optimal.

4.1.1.3 CloudBoot Compute Resources
CloudBoot functionality is a method of compute resource installation without the presence of a local disk or other local storage, utilizing the PXE and DHCP servers. To start using CloudBoot, you must have Integraded Storage configured and the CloudBoot enabled in the system configuration first. See CloudBoot Compute resources section for details. CloudBoot compute resources are used for smart and baremetal server provisioning.

4.1.1.4 Virtual Servers
OnApp gives you complete control of your virtual servers (VSs), and all files and processes running on those servers. You can start, stop, reboot and delete virtual servers. You can move VSs between compute resources with no downtime. OnApp also lets you perform automatic and manual backups, and restore VSs in case of failure.

When creating a virtual server, you can choose a compute resource server with data store attached if you wish. If not, the system will search for compute resources available that have sufficient RAM and storage for that virtual server, and choose the one with the lowest (but sufficient) amount of RAM available.

You can monitor the CPU usage of each virtual server, and the network utilization of each network interface. This helps you decide if and when to change the resources available to each VS. OnApp also provides detailed logs of all tasks which are running, pending, have failed or have been completed.

4.1.1.5 Smart Servers
Smart servers are dedicated entities based on CloudBoot compute resources with passthrough enabled. Smart servers are created and managed exactly the same as virtual servers, except only one smart server can be deployed per compute resource. Smart servers can be organized into zones to create different tiers of service - for example, by setting up different zones for smart appliances, with limits and prices specified per zone. Smart appliance zones can also be used to create private clouds for specific users.

4.1.1.6 Baremetal Servers
Baremetal servers are physical servers that reside directly on the hardware without the virtualization layer. Namely, baremetal server is a compute resource that runs on the OS installed. Baremetal compute resources cannot have more than one baremetal server located on it.

4.1.2 Storage devices
For VS template and backup storage we recommend that you set up a separate server with SSH (preferred) or NFS (for high end NAS). However, in a CloudBoot environment or for a small scale installation you can use the Control Panel server to host the templates and backups.
You will also need a storage platform for virtual server disk storage. From OnApp 3.0 onwards, there is an integrated storage platform that enables you to expose local storage drives across compute resources as a distributed block SAN with full redundancy and failover properties. Additionally, you can use any block based storage platform, such as local disks in compute resources, an Ethernet SAN such as iSCSI or AoE, or hardware (fiber) SAN. Storage Area Networks are core segments of the cloud system, and OnApp can control their physical and virtual routing. This control enables seamless SAN failover management, including SAN testing, emergency migration, and data backup.

### 4.1.3 Networks

With OnApp you can create complex networks between virtual servers residing on a single host, or across multiple installations of OnApp. You can configure each virtual server with one or more virtual NICs, each with its own IP and MAC address, to make them act like physical servers. OnApp ensures that each customer has their own dedicated virtual network, isolated and secure. They can only see their traffic, even if they share the same physical server as another customer. OnApp enables you to modify network configurations without changing actual cabling and switch setups.

### 4.1.4 Templates

An OnApp template is a pre-configured OS image that is used to build virtual servers. There are two types of templates for virtual server deployment in OnApp: downloadable templates provided by OnApp, and custom templates you create from existing virtual servers. The OnApp template library includes a wide range of VS templates for various flavors of Windows and Linux, both 32- and 64-bit.

At present OnApp does not support VSs/templates with Active Directory Domain Controllers.

### 4.1.5 Scalability

OnApp is a highly scalable cloud deployment and management tool that allows you to add and remove compute resources, data stores and resources at any time to meet your changing needs. You can add more CPUs and memory to a specific virtual server to increase its capacity, and increase the total available RAM and CPU by adding new compute resources.

### 4.1.6 High Availability

OnApp provides high reliability and availability in a number of ways:

- **Compute resource failover management system** — If a compute resource fails, OnApp's self-healing architecture automatically moves virtual servers to another box. Compute resources regularly update the control panel with their status. If they do not return valid data for a period of time, they are marked as offline, and an appropriate new compute resource is selected for a virtual server to boot there. This process is fully automatic but may take several minutes. When the crashed compute resource comes online, it will be again available, but virtual servers previously migrated from it will not be migrated back.

- **Virtual servers** — OnApp keeps virtual servers running even if the Control Panel server goes offline. In such an event, you won't be able to perform any actions to virtual servers until access to the Control Panel server has been restored.

- **Backup mechanisms** — There is storage security provided by the backup mechanisms on both virtual and physical storage. Both automatic and manual backups provide the ability to
capture the current state of a virtual server. You can always restore the virtual server from a backup if needed. There are also emergency MySQL backups as part of the disaster recovery system.

- **Database replication (planned feature)** — OnApp will feature database replication which includes the creation and maintenance of multiple copies of the same database. Database replication improves availability: when your main database becomes unavailable, the slave copy will take over.

### 4.1.7 Security

OnApp provides multiple layers of security:

- **Compute resource** — OnApp is a multi-compute resource cloud system that currently supports Xen, KVM and VMware (Hyper-V and other compute resources will be added in future releases). The first layer of security is provided by the compute resource itself. For example, Xen provides full isolation between virtual servers and allows each virtual server to access its own disk only. When a virtual server makes a request for data, it gets redirected to its correct disk. Xen dictates which virtual servers and resources are allowed to run or be accessed at any given time.

- **Firewall** — In addition to the compute resource security mechanism, there is also an anti-spoof firewall which resides on the server where you store virtual servers. The firewall enables the management operating system of the compute resource to examine packets entering and leaving the virtual server. It blocks packets that do not belong to the virtual server and accepts those meeting the rules. The firewall prevents IP spoofing and packet sniffing.

- **Control Panel** — Virtual servers in OnApp are completely controlled by the administrator. Administrators have full root (Linux) or Administrator (Windows) access to accounts and servers. The Control Panel also lets you assign different levels of user access to virtual servers, compute resources, consoles and disks.

- **Network Security** is provided by completely isolating virtual servers from each other using VLANs. Each customer can be assigned their own VLAN, so using their private IP they can only access addresses within that VLAN. Using a public IP, they can only access those boxes which are manually specified, using the Integrated Console.

### 4.2 Architecture

The OnApp Cloud Engine transforms your server and storage hardware into a virtual network system. Virtualization is realized by means of a compute resource which is also sometimes called a VMM (Virtual Machine Monitor). A compute resource is essentially hardware platform virtualization software using which one can run different OS on the same hardware at the same time. OnApp employs a Xen or KVM Compute resource virtualization architecture to control virtual protocols and security. With this infrastructure in place, OnApp users can host a multitude of secure cloud servers with more fluidity and control.

A schematic of the OnApp architecture is shown below.
4.3 API and Integrations

Our comprehensive RESTful xml and JSON API enables full integration of OnApp with third party applications.

OnApp integrates with popular billing applications like HostBill, Ubersmith and WHMCS, and with PHP applications via a wrapper (integration modules are available from the OnApp website: Downloads).

The API makes integration straightforward for other applications, too, including other control panels, CRM and support and billing systems.

For more detail on the OnApp API, refer to the API Guide.
5 Control Panel Overview

After you log in to the system, you can see the OnApp dashboard. The dashboard provides resource usage statistics, activity log, and your cloud summary. The sidebar menu consists of the following tabs:

- **Cloud** that includes *Dashboard, Service Catalog, Appliances, and Components* such as templates, service add-ons, recipes, etc.
- **CDN** that contains *CDN* related resources and server instances.
- **Metrics** that provides statistics on the usage of Cloud, Storage, CDN, and other available resources.
- **Admin** that allows administrators to manage compute resources, users, billing, notifications, settings, etc.

On this page:

- **Statistics**
- **Your Summary**
- **Activity Log**
- **Additional Navigation**

5.1 Statistics

You can select a time period (24 hours, 7 or 30 days) to generate the statistics. The statistics provide data on the usage of CPU, Memory, Storage, IOPS, Smart and Baremetal servers.

5.2 Your Summary

This section shows the total number of virtual servers, backups, and disk space you are using.

5.3 Activity Log

Activity Log is a record of recent transactions for your virtual servers. To view details of a transaction, click a *Ref* number.

5.4 Additional Navigation

From the top pane, you can run the following actions:

- Click the **Arrow** button to hide the sidebar menu.
- Use **Search** to run a global search across the cloud.
- Click your login to view *My Profile* or to log out.
- Click the **Create Server** button to create a new server instance.
- To hide the infobox on a particular page, click the **Close** button in the upper-right corner of the infobox. For more infobox settings, refer to the *User Profile* section.
5.5 User Profile

Click your account name at the top of the Control Panel screen to view tabs with the details of the user account you're currently logged in with. It also includes infobox options and API Key information. If permissions allow, the tab with a custom name can be displayed as an iFrame. This is configured by administrator. Administrators can view details of all account profiles through the Control Panel > Admin > Users menu.

This chapter contains information on the following tabs that comprise the user profile:

- Overview
- Payment
- Bucket
- Backups
- Service Insertion Framework

5.5.1 Overview

This tab contains information on the user's login, user roles, bucket, prices and other.

5.5.1.1 Profile

User Details

- Full name - user's name and surname.
- Email - user's email.
- Login - user's screen name.
- User Roles - the role set for the user.
- User Group - the group to which this user is assigned.
- Time Zone - time zone set for this user.
- Locale - locales set for this user.
- System Theme - the color scheme: light or dark.
- Display infoboxes – whether infoboxes are displayed or not for this user.
- Restore infoboxes - click this button to display infoboxes for the user (this option may be disabled depending on the user's permissions).
- Last Access Log - click to see information on the IP addresses that logged in to your account directly from the OnApp login page using your login and password, and the time and date of access.
Amazon Web Services

- **Status** - the status of the Amazon Web Services: disconnected or connected.

Additional Info

User Additional Fields allow administrators to create custom fields and use them with the API or a third party system. These fields will vary for different users, depending on the information the administrator wants them to fill in.

Oauth Authentication

OAuth - open standard for authorization - enables users to log into OnApp using their Google and Facebook accounts. For users to access this feature, it should be enabled by the Cloud Administrator.

- **Facebook** - click **Connect** to set up this option. If it is configured correctly, you will be able to log in to your account by entering your Facebook login details.
- **Google** - click **Connect** to set up this option. If it is configured correctly, you will be able to log in to your account by entering your Google login details.

API Info

- **API key** - click the **Regenerate Key** button to generate a new API key.

For more information, see **API Key**.

Yubico info

- **Use Yubikey** - move the slider to the right to enable logging in using a Yubikey for this user. Enter the Yubikey in the form that appears:
  
a. Insert the Yubikey into your computer's USB port. If the Yubikey is connected correctly, its status light will turn green.
  
b. Click in the **Enter your Yubikey** field.
c. Press your finger to the gold Yubikey button. A long line of characters will appear in the field.

Billing Details
- **Price per last hour** - shows the price for VVs, Load Balancers, and other resources charged for the previous hour.
- **Bucket** - the bucket this user is assigned to. Click the bucket label to see its details.
- **Outstanding amount** - the total amount of money owned by this user since it has been created, for all resources, minus the amount of Payments. The sum is displayed for the period since a user has been created until the last 24hrs.
- **Monthly fee** - a set monthly price for a bucket.
- **Total cost** - the sum of all used resources cost and virtual servers cost. This sum does not take into consideration the free limits for resources set in the bucket. The cost that takes into account the bucket's free limits is displayed in the **Total cost with discount** field.
- **Payments** - the total amount of payments made.
- **Discount due to free** - the price of the resources that were created within the bucket's free limits. This sum will be subtracted from the **Total cost**.
- **Total cost with discount** - the price of used resources that excludes the cost of the resources that were created within the bucket's free limits.
- **Virtual Server Hourly Statistic** - clicking this link will generate billing statistics for all virtual servers owned by this user. For more information, see **Virtual Server Billing Statistics**.
- **User Statistic** - clicking this link will generate user's resource usage statistics. For more information, see **User Billing Statistics**.
- **Monthly Bills** - clicking this link will generate the bills list that shows the total due per each month of the year. To view billing statistics, select a year from the drop-down list and click **Apply**. The list that appears displays a particular month of the selected year and the cost of used resources for that month. At the bottom of the list there is the total amount of money which was to be paid for the selected period.

Prices
The list of all used resources and their price per hour for two states: server powered ON and server powered OFF. The prices in this section do not take into consideration the free limits for resources set in the bucket.

Servers
Shows the list of all virtual servers, load balancers, edge servers, smart servers, application servers in the cloud with their prices for server on and off. The prices in this section do not take into consideration the free limits for resources set in the bucket.

Backups
The prices in this section do not take into consideration the free limits for resources set in the bucket.

- **Backups Count** - the price per hour for the quantity of the user's backups.
- **Templates Count** - the price per hour for the quantity of the user's templates.
- **ISOs Count** - the price per hour for the quantity of the user's ISOs.
- **OVAs Count** - the price per hour for the quantity of the user's OVAs.
- **Templates, ISOs & Backups Disk Size** - the price per hour for the disk space user's /ISOs/backups/templates occupy.
- **Autoscaling Monitor Fee** - the price per hour for autoscaling monitors.
- **Backup Server Groups** - the price per hour for the resources consumed by backup server groups.

To edit the details of the user profile, click the edit button in the upper right corner. You will then be redirected to a page where you can change the details of your profile. Besides the details described above, you can also change the password and auto suspending settings.

### 5.5.2 Payments

This tab contains the list of your paid invoices.

### 5.5.3 Bucket

This tab contains the details of the bucket assigned to the user. Access Control tab contains the list of the maximum and minimum amount of resources available to the user. Rate Cards tab contains information on the free amount of resources and prices for the resources when the free limit is exceeded. The lists of all used resources will vary depending on the type of server (virtual, smart, baremetal, vpc or other). The following sections are displayed:

- **Miscellaneous** - resources for virtual servers, application servers, container servers, autoscaling and other.
- **Limits & Pricing for Compute Zones**
- **Limits & Pricing for Data Store Zones**
- **Limits & Pricing for Network Zones**
- **Limits & Pricing for Backup server Zones**
- **Limits for Instance Packages**
- **Limits for guaranteed minIOPS**
- **Limits for Edge groups**
- **Limits for Template Store**
- **Limits for Service Add-on Groups**
- **Limits for Recipe Groups**

### 5.5.4 Backups

This tab contains the list of the user's backups. For each backup the following details are displayed:

- **Date** - the date when the backup was made.
- **Target** - target for which the backup was taken - either a disk (for normal backups) or a virtual server (for incremental backups).
- **Status** - the status of the backup, whether it was built or not.
- **Backup Size** - the size of the backup in MB.
- **Initiated** - how the backup was launched - either manually or automatically on a periodic basis - annual, monthly, weekly or daily.
- **Backup Server** - the backup server where the backup is stored.
- **Note** - an arbitrary note to the backup.
• VS - the virtual server for which the backup was taken.
• Customer - the customer this backup refers to.
• Actions - you can convert the backup to template, restore the system from the chosen backup, view Virtual Server backups for this particular VS, delete the backup, add or edit the backup's note.

5.5.5 Service Insertion Framework
This tab is service insertion framework show page. The title of this tab is set by the administrator when configuring this option. If permissions allow, this option displays a web page within the user OnApp Control Panel.

5.6 API Key
The API Key is used instead of the normal username/password credentials during API operations. A key is generated for each user by the system when the user account is created. To change the key, click the Regenerate Key button. A new key will be generated, and you'll be taken back to the main Dashboard screen.

5.7 Cloud Search Tool
The search tool in the upper right corner allows you to search your cloud for:
• IP addresses
• Usernames
• Users full names (first or last name, in any order)
• VS labels
• VS identifiers
• Disk identifiers
• Log IDs
• Backups
• Template labels
• Permission labels/identifiers
• OnApp page URLs/titles
• Any word from locale texts (yellow help box texts), if other search results are not successful
Type what you want to search for into the search box and confirm. The results are organized according to the menu item they refer to, e.g., Pages, Virtual Servers, Users, Locales, etc. Click a search result to open the relevant details page.
6 Your Notifications

Your **Notifications** are displayed as a bell near your profile icon and contain the internal notifications addressed to you. These notifications are configured at **Control Panel > Admin > Notifications**. The notification count includes only unread notifications. If permissions allow, you can configure the amount of unread notifications at **Control Panel > Notifications > Configuration**. Each of the notifications is displayed with the following details:

- **Topic** - the event about which the notification is sent
- **Message** - the message of the notification. The message of an unread notification is displayed in bold. Click the message to view its full text. The notification will include the text generated by the alert and also might include additional text added by the administrator.
- **Date** - the time when the notification was delivered

Notifications can be set regarding the following events:

- **All compute resources status** - all compute resources in a compute zone have changed their statuses to Online/Offline/Inactive
- **Can't schedule transaction** - a transaction could not be scheduled in the cloud
- **Daemon notification** - the status of the OnApp engine has changed to Active/Up/Inactive
- **Daily storage health report** - the daily storage health report will be sent in the notification
- **Failed task** - a task failed in the cloud
- **Failover process** - failover process has been initiated
- **Generate hourly stats failed** - hourly statistics failed to be generated
- **Hourly storage health report** - the hourly storage health report will be sent in the notification
- **Compute resource missing CPU flags** - a compute resource without CPU flags has been detected in the cloud
- **Compute resource status** - one of the compute resources in the cloud has changed its status to Online/Offline/Inactive
- **Compute resource group responsive** - an unresponsive compute zone has been detected in the cloud
- **Maintenance mode** - the Control Panel has been switched to maintenance mode
- **Reclaim baremetal compute resource** - a baremetal server has been deleted. It has been removed from the DB, but it may remain working. To fully remove the baremetal server it might be required to reboot the compute resource on which it was running.
- **System resources** - a hardware resource of the CP server is exhausted
- **Wrong activated logical volumes** - the system has detected VSS's disks that are either activated on the wrong compute resource or on two compute resources simultaneously
- **Custom event** - an administrator can add a custom event. Such events have custom names set by the admin.
- **Internal server error** - an internal server error occurred in the system
## Service Catalog

You need to have the corresponding permissions to create new entities.

The service catalog page gives you quick access to the creation wizards of most common OnApp entities at Control Panel > Cloud > Service Catalog. You can create the following components using the service catalog:

- Virtual Server
- Storage Server
- Container Server
- Balancer
- Edge Server
- Smart Server
- Baremetal Server
- EC2 Instance

See also:
- Cloud Panel Overview
- Appliances
- CDN
- AWS
8 Appliances

Appliances is a collective name for all virtual and physical devices that can be provisioned in the cloud. The term appliance seizes the following cloud components:

- Virtual Servers
- ISO Virtual Servers
- vCloud Director Virtual Servers
- Container Servers
- VMware Virtual Servers
- Smart Servers
- Baremetal Servers
- Load Balancers
- Compute Resources
- Assets

OnApp doesn't provide the technical support for configurations you apply inside your virtual server instances and other appliances.

8.1 Virtual Servers

Virtual servers are based on templates and are deployed on compute resources. Compute resources give them access to CPU, disk and network resources. OnApp Cloud gives you high-end cloud management features including:

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<thead>
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<th>Networks</th>
<th>Disks</th>
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<th>Backup Schedules</th>
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</thead>
<tbody>
<tr>
<td>Edit</td>
<td>Reboot</td>
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<td>Configure network interface</td>
<td>Create disks</td>
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<td>View schedules</td>
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<tr>
<td>Rebuild manually</td>
<td>Reboot in recovery</td>
<td>Change owner</td>
<td>Rebuild network</td>
<td>Edit disks</td>
<td>Take Virtual Server Backup</td>
<td>Create schedule</td>
<td>Billing statistics</td>
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</tr>
<tr>
<td>Migrate</td>
<td>Suspend</td>
<td>Set SSH keys</td>
<td>Set firewall rules</td>
<td>Migrate disks</td>
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<td></td>
</tr>
<tr>
<td>Delete</td>
<td>Shut down</td>
<td>Edit Administrator's note</td>
<td>Virtual server IP addresses</td>
<td>Delete disks</td>
<td>Convert backup to template</td>
<td>Delete schedule</td>
<td>Disk IOPS statistics</td>
<td></td>
</tr>
</tbody>
</table>
OnApp supports two kinds of storage for virtual servers: traditional centralized SANs, and the new distributed block storage functionality introduced with OnApp Storage, in which local disks in compute resources provide the physical storage space allocated to virtual servers. In each case, the OnApp platform creates virtual data stores from the physical resources, and uses these to provide virtual servers with virtual disks.

Administrators in OnApp have full control over the lifecycle of virtual servers. Virtual servers can be in the following states:

- **Created** - A server is created when you successfully Create Virtual Server from the Virtual servers menu, having selected its template and set its properties, resources and network requirements.

- **Build** - A virtual server must be built after it is created. Building is the process of actually allocating the physical resources specified during its creation. This can be done manually, or automatically if you check the Build Virtual Server Automatically box during the creation process.

- **Powered on** - A power on starts the virtual server, its operating system and processes.

- **Powered off** - If the operating system cannot be stopped, it will be forcefully terminated.

- **Shut down** - A shut down will attempt to gracefully stop a virtual server and its operating system, which typically involves terminating all running applications.

- **Rebooted** - Rebooted means a virtual server has been shut down, and then powered on again.

- **Deleted** - When a virtual server is deleted, its backups are still stored on the server and can be restored if required.

- **Re-built** - To rebuild a virtual server means to reinstall the template and reconfigure the resources and network. All data will be lost.

- **Failed** - A failed virtual server is one that is down, for example because of hardware or network problems. You will have to start the server manually when those problems have been solved.

### 8.1.1 Create Virtual Server

Virtual servers are created from templates. To create a virtual server:

<table>
<thead>
<tr>
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<th>Administrative Options</th>
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<tbody>
<tr>
<td>Segregate</td>
<td>Startup</td>
<td>Integrated console</td>
<td>Display network speed for network interfaces</td>
<td>Edit backup note</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set VIP status</td>
<td>Startup on Recovery</td>
<td>Transactions and logs</td>
<td>Edit network speed</td>
<td>Restore backup</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autoscale</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>Delete backup</td>
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<td></td>
</tr>
<tr>
<td>Clone</td>
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<td></td>
<td></td>
<td></td>
<td>Edit backup note</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Go to your Control Panel > Cloud > Virtual Servers menu and click the “+” button, or click the Create Virtual Server button at the bottom of the screen. This will start a VS creation wizard.

2. Fill in the wizard step by step. Each of these steps is described in the corresponding sections below.

3. Click the Create Virtual Server button to start the creation process. You will be taken to the virtual server details screen.

OnApp must be configured properly before VSs can be created. You must:

- Have at least one data store configured and assigned to a data store zone
- Have at least one network configured and assigned to a network zone
- Have at least one compute resource configured and online
- Have at least one compute resource assigned to a compute zone
- Have at least one data store attached to a compute resource
- Have at least one network attached to a compute resource
- Have assigned a bucket to the user creating the VS

On this page:
Cloud Locations
Templates
Virtual Server Properties
Resources
Recipes
Confirmation

8.1.1.1 Step 1 of 6. Cloud Locations

If you face the problem with viewing the maps, refer to the Add Google Map API Key section of Administrator guide.

At this step indicate your virtual server’s cloud location:

- Country - choose the country, where the cloud is located, from the drop-down menu.
- City - specify the city, where the cloud is located, from the drop-down menu.

Click Next to proceed to the following step of the wizard to specify the virtual server templates.

If compute resources of your bucket do not have assigned location groups (or have only one assigned location group), this step of the wizard will be missing.

8.1.1.2 Step 2 of 6. Templates

At this step, specify the template from which your virtual server will be built.

To choose a template:
1. Click the required group icon on the right (Windows, Linux, FreeBSD etc.) to expand the list of templates on the left. Every template contains the following info:
   - Template's label
   - Min memory size, required to create a VS from this template
   - Min disk size, required to create a VS from this template
   - Virtualization type (XEN, KVM)
   - Price per hour

2. Select the template.

3. Click Next.

**Windows Licensing Type**

This option only appears if your bucket allows it, and if the relevant licensing options have been configured for the template group this template belongs to. If this option is available, choose the license type you require:

- For the KMS type, choose the licensing server
- For your own license, type your license key

If you don’t specify the licensing type, MAK licensing will be set by default.

Consider the following when creating a VS on Windows templates:

- It is possible to deploy Windows virtual servers without running sysprep. To do so, you need to disable the **Run Sysprep** option for the Compute zone the virtual server will be built on. See [Create Compute Zone](#) section for details.
- If there are several virtual servers simply deployed from the same template in the cloud, they will have identical SIDS. This will result in the system conflict.
- It is not possible to select KMS or own licensing type when creating a Windows virtual server from custom template. As a workaround, you can create a virtual server from the template used for custom template creation.

Proceed to the following step of the wizard and specify the virtual server properties.

---

**Template extraction is performed during server provisioning or taking a backup when using a particular template. To prevent template from being used in other transactions during extraction, template is locked during the extraction and unlocked on accomplishment. If other transaction tries to use the locked template, it will fail after 5 minutes of standby. Transaction which locked template and failed, means that extracted template is broken.**

**Storing scheme:**

- template /onapp/templates/your_template.tgz
- extracted template /onapp/backups/templates/your_template
- locked template /onapp/backups/templates/your_template.lock
8.1.1.3  Step 3 of 6. Virtual Server Properties

At this step you need to indicate your virtual server's properties, such as label, Compute resource, password and other. You can create a virtual server having specified only the required parameters and configure it later.

Specify the following virtual server properties:

- **Label** - the label of the virtual server. The required parameter.
- **Hostname** - the hostname of the virtual server. The required parameter. The hostname should consist of letters [A-Z a-z], digits [0-9] and dash [ - ]. For more info on hostname validation, refer to RFC standard documentation.

**Particular characters are not allowed for Windows-based virtual servers:**

- percent sign [%]
- double quotation marks [“]
- brackets [<,>]
- vertical bar [|]
- caret [^]
- ampersand [&]
- parentheses [(,)]

- **Domain** - specify the domain for this VS. The default value is *localdomain*. This parameter is not applicable to Windows virtual servers.

For example:

*test.onapp.com* - specify 'test' as hostname, 'onapp.com' - as domain.

If you leave the domain field blank, the default value 'localdomain' will be used and you will get the following - *test.onapp.com.localdomain*.

- **Time zone** - set the time zone for the virtual server. This parameter is applicable only to Windows XEN and KVM virtual servers.

Currently, the time zone is set at the Compute resource side only. Therefore, users need to set the target time zone inside a Windows VS manually. Setting correct time zone at the Compute resource side helps to keep correct time inside a VS after starting it if time synchronization is not completed for some reason.

- **Password** - a secure password for the VS. It can consist of 6-99 characters, letters [A-Za-z], digits [0-9], dash [-] and lower dash [ _ ], and the following special characters: ~ ! @ # $ * _ - + = \ { } [ ] : ; ' , . ? / . You can use both lower- and uppercase letters. If you leave password field blank, it will be generated automatically.

- **Password confirmation** - repeat the password to confirm it.
- **Encrypt password** - move the Encrypt Password slider to the right, to encrypt your password, then enter an encryption key in the field that appears.

Click **Next** to proceed to the following step of the wizard to specify the virtual server server resources.
8.1.1.4 Step 4 of 6. Resources

At this step, you can set your virtual server's resources, such as disk size, network configuration and other.

**Compute Resources**
- *Compute Zone* - the Compute zone to build the VS on
- *Compute Resource* - the specific Compute resource to build the VS on. Compute resource may be selected automatically according to the set provisioning type.

When the *Show Compute resources on Virtual Machine creation* permission is disabled (so that user cannot select the Compute resource, but can choose the virtualization type), the Compute resource that meets the virtualization type and the resources set will be automatically selected. The data store will be set according to the compute zone selected.

**Resources**
- *RAM* - set the amount of virtual server's RAM.

<table>
<thead>
<tr>
<th>KVM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Max RAM</td>
</tr>
<tr>
<td>&lt;=CentOS 6.2</td>
<td>512 GB</td>
</tr>
<tr>
<td>CentOS 6.3</td>
<td>2000 GB</td>
</tr>
<tr>
<td>&gt;CentOS 6.3</td>
<td>4000 GB</td>
</tr>
</tbody>
</table>

Set RAM to 512MB is you are creating a FreeBSD based virtual server. The RAM value can be later increased after the VS creation when editing the VS.

- *CPU Cores* - set the amount of virtual server's CPU cores. For KVM Compute resources, this parameter sets CPU sockets by default, unless CPU topology is enabled.
- *CPU Priority (or CPU Units)* - set virtual server's CPU priority. If the CPU units are switched on in the bucket for this user, then CPU priority is replaced with CPU units. Refer to Billing Calculation section for details on CPU units and CPU priority.

The following options are available for VSs based on KVM Compute resources only, providing the *Enable CPU topology permission* is switched on for the user:
- *Use CPU Topology* - move the slider to the right, to set the following parameters:
  - *CPU Sockets* - set into how many sockets the CPU cores should be arranged. This value will affect the amount of cores_per_socket.

**Setting the correct amount of CPU sockets**

If the CPU topology is enabled, the CPU cores will mean a number of vCPUs, which is the maximum value that can be arranged into cpu sockets.
and cores per socket. If the CPU topology is disabled, the CPU cores will actually mean the CPU sockets value with 1 core_per_socket.

- Set the total amount of virtualized CPUs and the number of sockets.
- The value of cores_per_socket will be calculated automatically by the formula vCPUs = cpu_sockets x cores_per_socket.
- Thus, if you set the vCPU value 8, and the CPU sockets 2, this means that the cores_per_socket value will be set 4.

**Primary Disk**

- *Data Store Zone* - choose a data store zone for VS's primary disk.
- *Primary disk size* - set the primary disk size.

**Swap Disk**

- *Data Store Zone* - choose a data store zone for VS's swap disk.
- *Swap disk size* - set the swap disk size. There is no swap disk for Windows-based VSs. In all other cases, swap disk size must be greater than zero.
- *Disable* - select the checkbox to disable a swap disk.

**Network Configuration**

- *Network Zone* - choose a network zone from the drop-down box.
- *Network* - choose the network from which the VS should get the IP address.
- *Show only my IP address* - tick this checkbox to view only own IP addresses in the IP addresses dropbox.
- *Selected IP address* - if the option is available, you can also assign an IP address for the VS from the drop-down menu. Indicate Compute resource and network to have the list of available IPs.
- *Port Speed* - set the port speed for this VS

**Selected IP address** option is enabled via the "Show IP address selection for new VS" slider on the Settings > Configuration screen (under the System tab).

You can't select unlimited port speed if the Network Zone is not selected. In this case the port speed will be 1 by default. It's possible to create virtual server with unlimited network speed without selecting a network zone only if you have only one Network Zone assigned to your bucket.

Click **Next** to proceed to the following step of the wizard where you can specify the virtual server recipes.
8.1.1.5 Step 5 of 6. Recipes
At this step you need to indicate the recipes you want to assign to your virtual server. This step is optional. You can create a virtual server without choosing recipes and add them later if required.

1. Choose a recipe you want to assign to this virtual server by dragging the required recipe to the Assigned recipes pane.
2. To add a custom variable, click the "+" button next to the Custom recipe variables title bar, then specify variable details:
   - Specify the recipe name and its value.
   - Move the Enabled slider to the right to allow use of this variable.
3. Click Next to proceed to the next step of the wizard that completes the virtual server creation process.

The recipes step can be missing in the wizard if there are no recipes created in the cloud.

If mentioned below prerequisites are met, the Recipes step will be replaced with the Service Add-ons step.

**Service Add-ons**

**Prerequisites**
Ensure that the following requirements are met to be able to assign service add-on to VS during its creation:

- *Replace Recipes with Service Add-ons on VS creation* permission is enabled
- Service add-on groups are available in your bucket
- The On Provisioning option is enabled for all or some of the service add-ons available to you within bucket.

In case there are no available service add-ons, this step of the wizard will be skipped.

At this step you need to indicate the service add-ons you want to assign to your virtual server. This step is optional. You can create a virtual server without choosing service add-ons and add them later if required.

1. Click the service add-on group icon on the left to expand the list of service add-ons on the right. Every service add-on contains the following info:
   - Label
   - VS's types, with which this service add-on is compatible
   - Description of the service add-on
   - Price per hour
2. Select the service add-on by clicking on it. You can select several add-ons from different service add-on groups. Click View Selected Add-ons to see the list of selected service add-ons. You can remove the selected service add-on from the list by clicking the × button near the add-on.
3. Click **Next** to proceed to the next step of the wizard that completes the virtual server creation process.

### 8.1.1.6 Step 6 of 6. Confirmation

At this step, configure the automation settings. This is the final step of the virtual server creation wizard.

- Move the **Enable Automated Backup** slider to the right if you want this VS to be backed up automatically (according to the backup settings configured in the Settings/Auto-backup Presets menu).
- Move the **Build Virtual Server** slider to the right if you want the system to automatically build the VS. If you leave this box blank, you will have to build your server manually after it is created.
- Move the **Boot Virtual Server** slider to the right if you want the virtual server to be started up automatically.
- Move the **Enable Autoscale** slider to the right to set autoscaling for this VS.
  - Until the **autoscaling rules** are configured the autoscaling itself will not start working.
  - If the **Enable Autoscale** slider is grayed out that means that you have reached the autoscaling limit in the bucket (or the max is set as 0).
- Move the Accelerate slider to the right to enable acceleration for this VS. For more information, refer to **CDN Accelerator** section.

The **Accelerate** slider is available if the following conditions are met:

- Accelerator is available in the network
- IP Address, selected during VS creation, is in the same network as Accelerator
- VS is created by setting own virtual server’s resources, not by selecting a predefined instance package
- The **Show IP address selection for new VS** slider is activated in the Control Panel **Settings > Admin > Configuration**
- Only HTTP is supported. Other protocols, including HTTPS, will be passed through to the VS directly.
- In order to route the VS’s traffic, the VS must be on the same network with the Accelerator.

At the Confirmation step you can find the configuration summary of VS, which will be created. You can view template's name, RAM size, number of networks, primary disk and swap disk size, number of cores.

After you set up all parameters, click the **Create Virtual Server** button to start the creation process.
8.1.2 Virtual Server Wizard Beta

OnApp 6.1 introduces a new beta version of the virtual server wizard. You can access the beta version of the wizard from the top bar on your Control Panel. To launch the wizard, click Create Virtual Server > Add Virtual Server Beta.

Note that a new beta version of the virtual server wizard is disabled by default. If you want to enable this version of the wizard, please contact your provider's support team to discuss your options.

In this section you can find the procedures to create virtual servers in the new wizard, using one of the following methods:

- From Custom Set of Resources
- From Instance Package

8.1.2.1 Create Custom Virtual Server Beta

Virtual servers are created from templates and are deployed on compute, storage, and networking resources. To create a virtual server, you need to launch a wizard. The wizard walks you through several steps to get your virtual server up and running. You can create virtual servers from instance packages or custom set of resources. In this document, you can find a detailed guidance on how to create a custom virtual server but first take a look at the following section.

8.1.2.1.1 Before You Begin

Before you begin to create a virtual server, take into consideration the following:

- You should have at least one compute resource configured and attached to a compute zone, a data store – to a data store zone and compute resource or zone, a network – to a network zone and compute resource or zone, a backup server – to a backup server zone and compute resource or zone, and a bucket – to a user who creates a virtual server.
The selected template should reside on a backup server attached to a compute resource or zone on which you want to build a virtual server.

You can create a custom virtual server only if you have the Select resources manually on virtual server creation permission enabled.

An Estimated Price per Hour in the wizard might be inaccurate if you don't have necessary permissions enabled, such as Show Compute Zones/Compute Resources on Virtual Server Creation; and if you don't select specific options for all resources.

On this page:

- **Before You Begin**
- **Cloud Locations**
- **Templates**
- **Properties**
- **Compute Resources**
- **Storage Resources**
- **Network Resources**
- **Recipes**
- **Confirmation**

See also:

- **Create Instance Package Virtual Server Beta**
- **Virtual Servers (API)**

To create a virtual server, follow the next procedure:

1. Go to your Control Panel and click **Create Server** on the top bar.
2. Click **Create Virtual Server Beta** to launch the wizard.
3. Follow the step-by-step instructions below to complete the wizard.
4. After you are finished, click the **Create Virtual Server** button.

8.1.2.1.2 Cloud Locations

The **Cloud Locations** step is available for users whose bucket includes compute zones assigned to location groups. If Cloud Locations are not available, the wizard starts from the **Templates** step. The **Cloud Locations** step is present in the wizard if the following requirements are satisfied:

- All compute zones that are added to a user's bucket are assigned to location groups.
- Compute zones that are added to a user's bucket are not assigned to the same location group.

When you are at the **Cloud Locations** step, select a location for your virtual server:

- **Country** - select a country where the cloud is located
- **City** - select a city from the country where the cloud is located
Click **Next** to proceed to the following step of the wizard.

### 8.1.2.1.3 Templates

The **Templates** step allows you to select a template from which to build your virtual server. The template is extracted when a virtual server is provisioned or when a backup is taken, using this template. While a template is being extracted, it is locked so that it can’t be used simultaneously in other transactions. After the extraction is finished, the template is unlocked. If another transaction requires the locked template, the transaction will fail after five minutes of standby. If a transaction that locked a template eventually failed, it means that the extracted template is broken. The templates are stored at /onapp/templates/your_template.tgz, extracted templates – at /onapp/backups/templates/your_template, and locked templates – at /onapp/backups/templates/your_template.lock.

To select a template, follow the next procedure:

1. Click a **Template Store** icon on the left to see templates that are available in this store. You can see the following details for each template:
   - **Label**
   - **Min memory size** that is required to create a VS from this template
   - **Min disk size** that is required to create a VS from this template
   - **Virtualization type** that is XEN or KVM
   - **Estimated Price per Hour** that is calculated for a VS in Mode ON and Mode OFF

2. Click a template to select it.

3. Click **Next** to proceed.

---

**Additional Information for Windows Templates**

The **Windows Licensing Type** box appears for Windows templates and includes license options that you configure for a corresponding template store. You can select one of the following license types:

- **MAK** - the default licensing type applicable to all Windows-based virtual servers. If you don't select the licensing type, **MAK** is set by default.
- **KMS** - the licensing type applicable to every virtual server since Windows 7, Windows Server 2008, and the following Windows versions. Click **KMS** and then select a licensing **Server**.
- **User license** - type your license key

When you create a virtual server from a Windows template, consider the following:

- You can create Windows-based virtual servers without running Sysprep. Disable the **Run Sysprep** option while creating or editing a destination compute zone.
- If multiple virtual servers are deployed from the same template without running Sysprep, they will have identical security identifiers (SIDs) that
can result in the system conflict.

- You can't select KMS or your own license when you create a Windows virtual server from a custom template. As a workaround, you can create a virtual server from a template used for custom template creation.

8.1.2.1.4 Properties

There are some obligatory and optional properties that you can provide for your virtual server. The obligatory properties are marked with an asterisk on the list and the optional properties you can edit after creating a virtual server.

Enter the following properties for your virtual server:

- **Label** - enter a label of the virtual server
- **Hostname** - enter a hostname of the virtual server. The hostname can consist of letters [A-Z a-z], digits [0-9], and dash [-]. For more info on hostname validation, refer to RFC documentation.

  **Additional Consideration for Windows**

  The following symbols are not allowed for Windows-based virtual servers:
  - percent sign [%]
  - double quotation marks [“]
  - brackets [<,>]
  - vertical bar [||]
  - caret [\^]
  - ampersand [&]
  - parentheses [(,)]

- **Domain** - enter a domain of the virtual server. For example, in test.onapp.com the test is a hostname and onapp.com is a domain. If you don't enter a domain, the default value localdomain is used as follows test.localdomain. This parameter is not applicable to Windows virtual servers.

- **Time zone (Windows)** - select a time zone for a Windows virtual server. Most operating systems implies that the hardware clock is in UTC, however, Windows implies a localtime. Therefore, you need to select a time zone for it to be properly handled on a compute resource level.

- **Password** - enter a secure password for the virtual server. It can consist of 6-99 symbols, including letters [A-Z a-z], digits [0-9], dash [- ], underscore [ _ ], and the following special characters: ~ ! @ # $ * _ + = \ ` \ { } | : ; ' , . ? / . You can use both lower and uppercase letters. If you don't enter a password, it will be generated automatically.

- **Password confirmation** - repeat the password to confirm it

- **Encrypt password** - move the slider to the right to encrypt your password. For more information on the password encryption, see FAQ.

- **Encryption passphrase** - enter a passphrase for encryption

- **Encryption passphrase confirmation** - repeat the passphrase for encryption
- **I want to create a VS with custom resources** - select the checkbox to create a virtual server based on a set of custom resources. If you don't select the checkbox, you can create a virtual server from instance packages.

Click **Next** to proceed to the following step of the wizard where you select a custom set of resources.

### 8.1.2.1.5 Compute Resources

Before you apply compute configuration, consider the following:

- If the *Show Compute Zones/Compute Resources on Virtual Server Creation* permissions are disabled, you cannot select a compute resource and zone for a virtual server. The compute resource and zone are set automatically according to a virtualization type and other selected resources. The data store is set automatically according to the selected compute zone.
- The *CPU Topology* and *CPU Sockets* options are available only for virtual servers based on KVM, providing that a user has the *Enable CPU Topology* permission.

You can define the following compute resources for your virtual server:

- **RAM** - enter the number of RAM. The maximum RAM that can be assigned to a virtual server depends on the virtualization type, operating system, and bucket settings.

  If you create a FreeBSD virtual server, set RAM to 512 MB. You can increase RAM later while editing the VS.

- **CPU Cores** - enter the number of CPU cores. For KVM compute resources, this parameter sets CPU sockets by default, unless *CPU Topology* is enabled. When *CPU Topology* is enabled, this number specifies how many virtual cores the virtual server will have.

- **CPU Priority (or CPU Units)** - enter the number of CPU Priority in %. If *CPU Units* are enabled on a user’s bucket, the CPU Priority is replaced with CPU Units.

- **Compute Zone** - a compute zone where to build the virtual server

- **Compute Resource** - a compute resource from the compute zone

  The following options are available only for virtual servers based on KVM:

  - **Use CPU Topology** - move the slider to the right to enable CPU Topology
  - **CPU Sockets** - enter the number of how many sockets the CPU cores should be arranged into. This value will affect the number of `cores_per_socket`.  


How to determine a correct number of CPU Sockets.

If CPU Topology is enabled, the CPU cores indicate a number of vCPUs - the maximum value that can be arranged into CPU sockets and cores per socket. If CPU Topology is disabled, the CPU cores indicate the CPU sockets value with one core per socket. When you enable CPU Topology, the following logic is applied to calculate CPU capacity:

Click **Next** to proceed to the following step of the wizard.

8.1.2.1.6 Storage Resources

You can specify a data store and disk size for a primary and swap virtual disks. You cannot add a swap disk to a Windows-based virtual server.

8.1.2.1.6.1 Primary Disk

Enter the following properties for a primary disk:

- **Size** - enter a size for a primary disk
- **Data Store Zone** - select a data store zone for a primary disk
- **Data Store** - select a data store for a primary disk

8.1.2.1.6.2 Swap Disk

Select the following properties for a swap disk:

- **Size** - enter a size for a swap disk
- **Data Store Zone** - select a data store zone for a swap disk
- **Disable** - select the checkbox to disable a swap disk
- **Data Store** - select a data store for a swap disk

8.1.2.1.7 Network Resources

Before you apply network configuration, consider the following:

- When you create a virtual server in Federation, you cannot set a network port speed to a value greater than indicated by a seller while adding a zone to Federation.
- Since not every application supports IPv6, at least one IPv4 address must be allocated to a primary network interface.
- The **Show only my IP addresses** checkbox appears only if you select a specific network, not Any network.
The Selected IP address option is available in the wizard if it is enabled via Admin > Settings > Configuration > System > Show IP address selection for new VS.

Enter the following properties for a network interface:

- **Network group** - select a network zone for the VS
- **Network** - select a network from which the VS should get the IP address
- **IP net** - select an IP net from which the IP address should be assigned
- **IP range** - select an IP range from which the IP address should be assigned
- **IP address** - select an IP address to be assigned to the VS
- **Port Speed** - set the port speed for the VS or select the Unlimited checkbox

Click Next to set the port speed for the VS or select the Unlimited checkbox.

8.1.2.1.8 Recipes

**Recipes**

The Recipes step is available in the wizard if there are some recipes created in the cloud. You can create a virtual server without a recipe and add them afterwards. To assign a recipe to your virtual server in the wizard, follow the next steps:

1. Drag and drop a recipe from the Available recipes to Assigned for provisioning box.
2. To add a custom variable, click the “+” button next to Custom Recipe Variables and provide the following details:
   - **Name & Value** - enter a name and value for the custom variable
   - **Enabled** - move the slider to the right to allow use of this variable
3. Click Next to proceed to the final step of the wizard.

8.1.2.1.9 Confirmation

Before you select settings from the final step, consider the following:

- The Enable Autoscale slider can be dimmed in the wizard if you reached the autoscaling limit in your bucket.
- For autoscaling to work properly, you need to enable autoscaling in the wizard and add auto-scaling rules.
- You can Enable Acceleration if the following requirements are satisfied:
  - Accelerator is enabled on the network attached to a virtual server.
  - The Show IP address selection for new VS option is enabled in Admin > Settings > Configuration.
  - The IP address assigned to a virtual server is in the same network as Accelerator.
  - Only HTTP is supported. Other protocols, including HTTPS, will be passed through to the virtual server directly.

The Confirmation step allows you to apply the following settings:

- **Enable Automated Backup** - move the slider to the right to create automatic backups of the virtual server based on the settings from Auto-Backup Presets.
• **Build Virtual Server** - move the slider to the to the right to automatically build the virtual server. If you don't select this checkbox, you have to build your server manually after it is created.

• **Boot Virtual Server** - move the slider to the right for the virtual server to be started up automatically.

• **Enable Autoscale** - move the slider to the right to use autoscaling for the virtual server.

• **Acceleration Allowed** - move the slider to the right to enable acceleration for the virtual server.

The **Confirmation** step also provides the configuration summary of the virtual server, including information about the template, CPU cores, RAM, disks size, and network. When you are finished, click the **Create Virtual Server** button to start the creation process. After you click the button, several transactions are run to complete the process. You can check a status of each transaction in **Activity Log** of the virtual server.

8.1.2.2 **Create Instance Package Virtual Server Beta**

You can create a virtual server from a ready-made instance package. The instance package is a preconfigured environment with a specific compute, storage, and network capacity. For instance packages to be available in the wizard, your Administrator needs to configure an environment where:

• Instance packages **permissions** are enabled

• Instance packages are added to your Control Panel

• Instance packages are added to your bucket

After these steps are completed, you can create virtual servers from instance packages in the wizard. The wizard walks you through several steps to get your virtual server up and running. In this document, you can find a detailed guidance on how to create a virtual server but first take a look at the following section.

**On this page:**

• **Before You Begin**

• **Cloud Locations**

• **Templates**

• **Properties**

• **Instance Packages**

• **Recipes**

• **Confirmation**

**See also:**

• **Create Virtual Server**

• **Permissions**

• **Buckets**

8.1.2.2.1 **Before You Begin**

Before you begin to create a virtual server, take into consideration the following:

• You should have an environment properly configured by your Administrator. The environment must provide at least one **compute resource** configured and attached to a
compute zone, a data store – to a data store zone and compute resource or zone, a network – to a network zone and compute resource or zone, a backup server – to a backup server zone and compute resource or zone, and a bucket – to a user who creates a virtual server.

- If an instance package applies only to certain compute zones in a bucket, a virtual server is created on one of the compute resources within one of those zones. If an instance package is not limited to certain zones, the compute zone and compute resource are selected automatically from the ones available to a user.

- Instance package virtual servers can be created only in compute zones where all compute resources are assigned the same number of CPU units. If there are compute resources with different number of CPU units, it's not possible to create instance package virtual servers in such zones. The reason is that CPU priority for instance package virtual servers in this configuration cannot be set to 100%, which is the default value for such virtual servers.

- If there are no available IP addresses, all instance packages are dimmed in the wizard.

- Instance packages that have resources incompatible with the available compute zones are dimmed in the wizard.

- Auto-scaling and Accelerator are not supported for virtual servers created from instance packages.

To create a virtual server, follow the next procedure:

1. Go to your Control Panel and click Create Server on the top bar.
2. Click Create Virtual Server Beta to launch the wizard.
3. Follow the step-by-step instructions below to complete the wizard.
4. After you are finished, click the Create Virtual Server button.

8.1.2.2.2 Cloud Locations

The Cloud Locations step is available for users whose bucket includes compute zones assigned to location groups. If Cloud Locations are not available, the wizard starts from the Templates step. The Cloud Locations step is present in the wizard if the following requirements are satisfied:

- All compute zones that are added to a user's bucket are assigned to location groups.
- Compute zones that are added to a user's bucket are not assigned to the same location group.

When you are at the Cloud Locations step, select a location for your virtual server:

- Country - select a country where the cloud is located
- City - select a city from the country where the cloud is located

Click Next to proceed to the following step of the wizard.

8.1.2.2.3 Templates

The Templates step allows you to select a template from which to build your virtual server. The template is extracted when a virtual server is provisioned or when a backup is taken, using this template. While a template is being extracted, it is locked so that it can't be used simultaneously in other transactions. After the extraction is finished, the template is unlocked. If another transaction requires the locked template, the transaction will fail after five minutes of standby. If a transaction that locked a template eventually failed, it means that the extracted template is

To select a template, follow the next procedure:

1. Click a Template Store icon on the left to see templates that are available in this store. You can see the following details for each template:
   - **Label**
   - **Min memory size** that is required to create a VS from this template
   - **Min disk size** that is required to create a VS from this template
   - **Virtualization type** that is XEN or KVM
   - **Estimated Price per Hour** that is calculated for a VS in Mode ON and Mode OFF

2. Click a template to select it.

3. Click **Next** to proceed.

---

**Additional Information for Windows Templates**

The **Windows Licensing Type** box appears for Windows templates and includes license options that you configure for a corresponding template store. You can select one of the following license types:

- **MAK** - the default licensing type applicable to all Windows-based virtual servers. If you don't select the licensing type, **MAK** is set by default.

- **KMS** - the licensing type applicable to every virtual server since Windows 7, Windows Server 2008, and the following Windows versions. Click **KMS** and then select a licensing **Server**.

- **User license** - type your license key

When you create a virtual server from a Windows template, consider the following:

- You can create Windows-based virtual servers without running Sysprep. Disable the **Run Sysprep** option while creating or editing a destination compute zone.

- If multiple virtual servers are deployed from the same template without running Sysprep, they will have identical security identifiers (SIDs) that can result in the system conflict.

- You can't select KMS or your own license when you create a Windows virtual server from a custom template. As a workaround, you can create a virtual server from a template used for custom template creation.

- You can build a **Windows 10/Windows Server 2016** virtual server on **KVM CentOS 6** and **CentOS 7** compute resources that run at least on the following processor:
  - **Ivy Bridge Intel® Xeon® Processor E Series v2 Family**
The `fsgsbase` CPU flag is required for a destination compute zone. For more information on CPU flags, see Manage Extended CPU Configuration for Compute Zone.

8.1.2.2.4 Properties

There are some obligatory and optional properties that you can provide for your virtual server. The obligatory properties are marked with an asterisk on the list and the optional properties you can edit after creating a virtual server.

Enter the following properties for your virtual server:

- **Label** - enter a label of the virtual server
- **Hostname** - enter a hostname of the virtual server. The hostname can consist of letters [A-Z a-z], digits [0-9], and dash [-]. For more info on hostname validation, refer to RFC documentation.
  
  **Additional Consideration for Windows**
  The following symbols are not allowed for Windows-based virtual servers:
  - percent sign [%]
  - double quotation marks [”]
  - brackets [<,>]
  - vertical bar [|]
  - caret [^]
  - ampersand [&]
  - parentheses [(,)]

- **Domain** - enter a domain of the virtual server. For example, in test.onapp.com the test is a hostname and onapp.com is a domain. If you don't enter a domain, the default value localdomain is used as follows test.localdomain. This parameter is not applicable to Windows virtual servers.

- **Time zone (Windows)** - select a time zone for a Windows virtual server. Most operating systems implies that the hardware clock is in UTC, however, Windows implies a localtime. Therefore, you need to select a time zone for it to be properly handled on a compute resource level.

- **Password** - enter a secure password for the virtual server. It can consist of 6-99 symbols, including letters [A-Z a-z], digits [0-9], dash [-], underscore [ _ ], and the following special characters: ~ ! @ # $ * _ + = \ { } [ ] ; : ; ' , . ? / . You can use both lower and uppercase letters. If you don't enter a password, it will be generated automatically.

- **Password confirmation** - repeat the password to confirm it

- **Encrypt password** - move the slider to the right to encrypt your password. For more information on password encryption, see FAQ.

- **Encryption passphrase** - enter a passphrase for encryption

- **Encryption passphrase confirmation** - repeat the passphrase for encryption
- I want to create a VS with custom resources - select the checkbox to create a virtual server based on a set of custom resources. The checkbox is displayed only if the Select resources manually on virtual server creation permission is enabled. See Create Virtual Server for details.

Click Next to proceed to the following step of the wizard.

8.1.2.2.5 Instance Packages

To create a virtual server from an instance package, click a box for a corresponding package. The instance package box includes the following details:

- CPUs - the number of CPU cores available in this instance package
- Memory - the number of RAM in MB or GB available in the instance package
- Disk Size - the number of disk size in MB or GB available in this instance package
- Bandwidth - the number of bandwidth in MB or GB available in this instance package
- Price per Hour:
  - Mode ON - an estimated hourly price if the virtual server is powered on
  - Mode OFF - an estimated hourly price if the virtual server is powered off
- Price per Month:
  - Mode ON - an estimated monthly price if the virtual server is powered on
  - Mode OFF - an estimated monthly price if the virtual server is powered off

After you click an instance package box, it becomes highlighted in green. Click Next to proceed to the following step of the wizard.

8.1.2.2.6 Recipes

During this step, you can assign recipes to your virtual server. The availability of recipes depends on your cloud configuration. The Recipes step is available in the wizard if there are some recipes created in the cloud. You can create a virtual server without a recipe and add them afterwards.

To assign a recipe to your virtual server in the wizard, follow the next steps:

1. Drag and drop a recipe from the Available recipes to Assigned for provisioning box.
2. To add a custom variable, click the "+" button next to Custom Recipe Variables and provide the following details:
   - Name & Value - enter a name and value for the custom variable
   - Enabled - move the slider to the right to allow use of this variable
3. Click Next to proceed to the final step of the wizard.

8.1.2.2.7 Confirmation

The Confirmation step provides the configuration summary of the virtual server, including information about CPU, memory, and disk size. Here you can also apply the following settings:
- **Enable Automated Backup** - move the slider to the right to create automatic backups of the virtual server based on the settings from Auto-Backup Presets.

- **Build Virtual Server** - move the slider to the right if you want the system to automatically build the virtual server. If you don't select this checkbox, you have to build your server manually after it is created.

- **Boot Virtual Server** - move the slider to the right if you want the virtual server to be started up automatically.

When you are finished, click the Create Virtual Server button to start the creation process.

After you click the button, several transactions are run to complete the process. You can check a status of each transaction in Activity Log of the virtual server.

### 8.1.3 Manage Virtual Server Power Options

Virtual Server power options include the list of actions that you can run to change a VS power status. You can manage power options for a specific virtual server or power on/off multiple VSs that reside on the same compute resource.

To manage power options for a specific virtual server:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the required virtual server.
3. Click the Tools button on the VS's screen to expand the Tools menu.
4. The Tools menu enables you to perform the following power actions on VSs (the exact list shown depends on the VS status):

   - Reboot Virtual Server
   - Reboot in Recovery
   - Suspend/Unsuspend Virtual Server
   - Shut Down Virtual Server
   - Startup Virtual Server
   - Startup on Recovery
   - Boot from ISO
   - Power On/Off Multiple VSs

#### 8.1.3.1 Reboot Virtual Server

To reboot a virtual server:

1. Click the Reboot Virtual Server button.
2. Click the OK button in the pop-up box to confirm the reboot.

#### 8.1.3.2 Reboot in Recovery

To reboot a virtual server in the recovery mode:

1. Click the Reboot in Recovery button.
2. Click the Yes button in the pop-up box to confirm the reboot in the recovery mode.

For VSs with a password encryption enabled, the temporary login is "root" and password is "recovery".

For VSs with a password encryption disabled, the "root" password will be used to reboot the VS in recovery.
Windows virtual servers boot from the Linux-based recovery template in the recovery mode. You need to log in as admin via SSH or VNC console and mount a Windows system disk manually.

You cannot work with the "whole" disk (like `mount -t ntfs-3g /dev/sdb1`) while mounting and checking block devices inside the recovery image as Windows disk is split into partitions.

8.1.3.3 Suspend/Unsuspend Virtual Server

To suspend/unsuspend a virtual server:

1. Click the **Suspend** button to stop a VS, change its status to suspended and disable all the major actions on VS, unless unsuspended.

   The virtual server is suspended immediately after clicking the **Suspend** button without an additional confirmation.

2. Click the **Unsuspend** button to activate the suspended VS and enable all the major actions.

8.1.3.4 Shut Down Virtual Server

To shut down a virtual server:

1. Click the **Shut Down Virtual Server** button.

2. In the pop-up box, select either the **Shut Down VS** option to terminate the VS gracefully or the **Power Off VS** option to terminate the VS forcefully.

3. Click the **Apply** button to shut down the VS.

8.1.3.5 Startup Virtual Server

To queue a start-up action for a VS that is currently powered-off, click the **Startup Virtual Server** button.

When you start up a VS, it might be implicitly cold migrated if the current
compute resource does not have sufficient resources.

8.1.3.6 Startup on Recovery

To start a VS in the recovery mode:
1. Click the **Startup on Recovery** button to start up a VS in the recovery mode.
2. In the pop-up box, click the **Yes** button to confirm the startup.

For VSs with a password encryption enabled, the temporary login is "root" and password is "recovery".

For VSs with a password encryption disabled, the "root" password will be used to start up the VS.

8.1.3.7 Boot from ISO

You can boot virtual servers from your own ISOs or the ISOs that are uploaded and made publicly available by other users. If you boot a VS from an ISO with the RAM requirement larger than the VS’s RAM, the transaction will fail. Make sure that you have the Any power action on own virtual servers and Allow own virtual servers to boot from ISO permissions enabled to have access to this feature.

To boot a VS from an ISO:
1. Click the **Boot from ISO** button.
2. Select the ISO image from which the VS will be booted.
3. Click the **Boot** button.

- Currently, OnApp supports only Linux ISOs.
- If you boot a VS from an ISO with the RAM requirement larger than the VS’s RAM, the transaction will fail.
- As soon as you boot a VS from the installation ISO, OnApp may lose control of any components (backups, networks, disks). The migration option is not available for VSs booted from ISO. The only available actions will be to start and stop a VS. Be aware that all the contents of the disk may be also deleted.
8.1.3.8  Power On/Off Multiple Virtual Servers

To power on and power of virtual servers that are run on the same compute resource, follow the next steps:

1. In the Admin tab, click All Compute Resources.
2. Click a label of a destination compute resource.
3. On the screen that appears, you will see a list of all virtual servers hosted on the compute resource.
4. Choose virtual servers that you want to power on or power off by selecting the required checkboxes in the first column of the table.

- To select all virtual servers residing on the compute resource, click the first checkbox. To cancel the selection of all virtual servers, click this checkbox again.
- If you select all virtual servers, only the powered-off VSs will be powered on, while the already powered-on VSs will be skipped and vice versa.

Depending on the current power status of the selected VSs, one of the following options will become available.

**Power On**

To power on the selected VSs:

- Click the Power On button.
- In the pop-up box, click the YES button to confirm your action.

**Power Off**

To power off the selected VSs:

- Click the Power Off button.
- In the pop-up box, select one of the following methods:
  - Gracefully shutdown - to run a graceful shutdown of VSs
  - Power Off - to run a forceful shutdown of VSs
- Click the Submit button to confirm your action.
The bulk power on/off actions are available only to virtual servers that are run on KVM and Xen compute resources.

Make sure that you have the *Any power action on own virtual servers* and *See all Compute resources* permissions enabled to have access to this feature.

### 8.1.4 Manage Virtual Server Administrative Options

To manage a virtual server administrative options:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the required virtual server.
3. Click the **Tools** button on the VS's screen to expand the VS Tools menu.
4. The **Tools** menu enables you to perform the following administrative action on VSs:

   - **Reset Root Password** - resets the root password for this VS (the password is displayed in VS Information).

     Particular characters are not allowed for Windows-based virtual servers:
     - percent sign [%]
     - double quotation marks ["]
     - brackets [<,>]
     - vertical bar []
     - caret [^]
     - ampersand [&]
     - parentheses [(.)]

   - **Edit FQDN**
     
     To edit FQDN (fully qualified domain name):
     i. Click the **Edit FQDN** button.
     ii. In the pop-up dialog box, edit the hostname and the domain name.
     iii. Move the **Force** reboot slider to the right to enable FQDN update in case the transaction fails with a running virtual server.

     - If the Force reboot is disabled, the FQDN will be changed on the fly if possible. If it is not possible, the transaction will fail and the FQDN won’t be changed.
- If the Force option is enabled, you will see two more options, Shutdown type and Required startup.

iv. Select the shutdown type from the dropdown list (Gracefully shutdown or power off).
   - *Gracefully shutdown* - to run a graceful shutdown of VSs
   - *Power Off* - to run a forceful shutdown of VSs

v. Tick the *Required startup* checkbox to start up the virtual server automatically after the FQDN is updated.

vi. Click the **Submit** button.

### 8.1.5 Virtual Server Integrated Console

OnApp provides an integrated VNC console that gives users direct access to their virtual servers through the Control Panel UI. The *noVNC* console is provided for virtual servers that are built on KVM CentOS 7 based on WebSockets. The console connects a user browser to a VNC port or VNC WebSocket port available via a compute resource for the guest console.

To access the virtual server VNC console via the Control Panel:

1. Go to the **Cloud > Virtual Servers** menu.
2. Click a label of a destination virtual server.
3. Click the **Console** button.

For the HTML5 console, click the **Re-connect** button if the connection is lost. The re-connection to the console runs as follows:

- If the console runs as expected, clicking the **Re-connect** button causes disconnection and the console is re-connected automatically after 1.5 seconds.

- If the console gets stuck, clicking the **Re-connect** button runs your request once again and re-connects the console without reloading.

- If the console gets disconnected with a status code and an error message, the console is re-connected automatically after 1.5 seconds.

### 8.1.6 Virtual Server Transactions and Logs

The system records a detailed log of all the transactions happening to your virtual servers. The list of transactions logged by the system includes:

- Provision virtual server
- Startup virtual server
- Stop virtual server
- Resize virtual server without reboot
- Configure Operating System
- Build disk
- Resize disk
- Format disk
- Destroy disk
- Take backup
- Convert backup
- Restore backup
- Destroy backups
- Destroy virtual server
- Destroy template
- Download template
- Update firewall

To view transactions for a virtual server:
1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you’re interested in.
3. The details screen for that virtual server shows recent transactions in the **Activity Log** section.

To cancel pending tasks, click the **Cancel All Pending Tasks for this virtual server** button.

You can also view the details of a particular log item by clicking its Ref number. The page that loads shows the log output and the following details:

1. o **date** - time in the \[YYYY\][MM][DD][T][hh][mm][ss]Z format
   o **action** - the action name
   o **status** - the action status (Complete, Warn, Pending, or Failed)
   o **ref** - the log item’s Ref number
   o **target** - the action target
   o **started at** - the time when the action was started
   o **completed at** - the time when the action was completed
   o **template** - template of the server the action refers to
   o **compute resource** - the label of compute resource
   o **initiator** - the user who initiated the action

If you want to see only the detailed output, you can hide log info with the arrow button in the upper right corner.
8.1.7 Virtual Server Recipes

To manage virtual server recipes:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the server you’re interested in.
3. Click the **Overview** tab, then choose **Recipes**.
4. The screen that follows shows details of all the recipes in the cloud:

   - The left pane shows the list of available recipes organized into recipe groups.
   - The right pane displays the list of events to which the recipes can be assigned to. Click the arrow button next to event to expand the list of recipes assigned to it.

**Assign recipe**

Use drag and drop feature to assign recipe to a desired event.

You can assign virtual server recipes to the following events:

- **VS provisioning** - run the recipe during VS provisioning
- **VS network rebuild** - run the recipe when rebuilding a network
- **VS disk added** - run the recipe when adding a disk
- **IP address allocated for VS** - run the recipe when adding an IP address to the VS network interface
- **IP address revoked from VS** - run the recipe when removing an IP address from the VS network interface
- **VS network interface added** - run the recipe when adding a network interface
- **VS network interface removed** - run the recipe while deleting a network interface from the virtual server
- **VS disk resized** - run the recipe when resizing a VS disk
- **VS resize** - run the recipe when resizing a VS
- **VS IP address add** - run the recipe while adding an IP address the virtual server
- **VS IP address remove** - run the recipe while removing an IP address from the virtual server
- **VS start** - run the recipe while starting the virtual server
- **VS reboot** - run the recipe while rebooting the virtual server
- **VS hot migrate** - run the recipe during the hot migration of the virtual server
- **VS hot full migrate** - run the recipe during the hot migration of the virtual server with disk
- **VS failover** - run the recipe during the failover process

**To use drag and drop:**
1. Click the arrow button in front of the required event to unfold it.
2. Select the required recipe in the left pane and hold it down with the left mouse button.
3. Drag the recipe up to the right pane and release the mouse button to drop the recipe and add it to the required event.

**Remove recipe**

To remove recipe:
1. Click the arrow button in front of the required event to view the list of recipes assigned to it.
2. Click the Delete button next to the recipe you want to remove.

### 8.1.8 Virtual Server Recipe Custom Variables

You can define custom variables for particular virtual servers. Each custom variable is a name-value set that can be used during the virtual server recipe implementation. Custom variables are set on a per server basis. You can create custom variables during the virtual server creation or via the virtual server Overview menu.

**To create a new custom variable:**
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. You'll see a list of all virtual servers in your cloud. Click the name of a virtual server for which you want to create a variable.
3. On the virtual server details screen, click the Overview tab, then choose Recipes Variables.
4. On the screen that appears, click the "+" button.
5. Specify the recipe name and its value.
6. Move the Enabled slider to the right to allow use of this recipe.
7. Click Save.

**To edit a custom variable,** click the Edit icon next to the required variable and change its details.

**To delete a custom variable,** click the Delete icon next to the variable you want to remove. You will be asked to confirm the deletion.

---

It is possible to set custom variables for image templates, as well as for virtual servers. Note: virtual server custom variables will always overlay template custom variables.
8.1.9 View Virtual Servers

To view all virtual servers deployed in the cloud:

1. Go to your Control Panel > Cloud > Virtual Servers menu to see an overview of all virtual servers in the cloud.

2. The page that loads will show the list of VSs together with their:
   - operating system
   - label. Click the label to see the VS details.
   - VIP status (enabled or disabled). Click the icon to enable/disable VIP status of a particular VS.
   - IP addresses
   - allocated disk size
   - RAM
   - backups - the number of backups and the space these backups take.
   - compute resource - the label of compute resource with which VS is associated
   - user - the owner of this VS. Click the user name to see the owner details.
   - power status. Click the on/off buttons to change the status.

3. Click the Actions button next to the VS for the quick access to the list of VS actions (the list of actions displayed depends on the VS status):
   1. Reboot a VS
      o Recovery reboot
      o Power off a VS
      o CPU usage
      o Backups
      o Shutdown
      o Start up
      o Recovery start up
      o Unlock

To search for a particular virtual server, click the Search icon at the top of the VS list. When the search box appears, type the text you want to search for and click the Search button:
8.1.10 View Virtual Server Details

To view details of a specific virtual server:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. The screen that appears loads the VS properties, notes, activity log and tools for managing your VS.

8.1.10.1 VS Properties

VS properties page gives general overview of the VS details:
- Template this VS is built on
- Power status & On/Off/Reboot buttons.

Clicking the OFF button performs graceful shutdown and then powers off the virtual server after the timeout set in Configuration settings.

- FQDN (fully qualified domain name)
- Compute resource. Click the compute resource name to see its details
- Location group. Click the location to view the details of the location group with which the VS is associated.
- Login credentials
- Owner. Click the owner name to see its details.
- VIP status (on/off). Click the icon to change the status.
- Estimated Price per hour. This sum does not take into consideration the free limits for resources set in the bucket. Therefore, the final price for the server might differ from the sum indicated here.

Please pay attention that when you edit a VS, the price is changed, and the new price is not applied immediately. It takes about 5 minutes to take effect.

- Memory
- CPU(s)/shares
- Disk Size
- Disk backups
- Network Speed
- IP Addresses. Only the first five IP addresses are displayed on the virtual server properties page. To view the list of all virtual server IP addresses, mouse over IP addresses area or go to the Networking > IP addresses tab. To view external IP addresses, you have to add them via API call first. To add an external IP address, refer to Add/Edit External IP Address section of API Guide. Once you've added an IP address, you can view it after the -> sign. E.g. 7.7.0.17 -> 8.8.8.7
- Autoscale - move the slider to enable/disable the autoscaling rules set for this VS.

Until the autoscaling rules are configured the autoscaling itself will
not start working.

- If the **Autoscale** slider is greyed out that means that you have reached the autoscaling limit in a bucket (or the max is set as 0).

- Auto-backups - move the slider to enable/disable automatic backups for this VS. If the incremental backups are enabled in your cloud, you can set auto-backups per VS rather than per disk.

  If the automation options weren’t enabled during this virtual server creation, you’ll be redirected to the form where you can configure them.

- Accelerate - move the **Accelerate** slider to the right to enable acceleration for this VS or move this slider to the left to disable acceleration for this VS. This option is available if the cloud administrator has CDN enabled for the cloud and has added and configured an Accelerator. For more information, refer to **CDN Accelerator** section.

### 8.1.10.2 Notes

The Notes section lists brief comments or reminders for a VS. You can add either Admin’s or User’s notes. The Admin’s note will be available to cloud administrators. Click the **Actions** button in the Notes section of the page to add admin’s or user’s note.

### 8.1.10.3 VS Management

- Click the **Tools** button to expand the Tools menu with the VS management options.
- Use the top menu to manage your virtual servers’ **statistics/networking/storage** options.

### 8.1.11 Edit Virtual Server

You can edit CPU and RAM resources for all VSs. Depending on the OS it is built on, some VSs can have their CPU and RAM resized without needing to be powered off ("resize without reboot").

**Windows virtual servers cannot be resized without reboot.**

To adjust VS CPU & RAM resources:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the server you want to resize, to show its details screen.
3. Click the **Tools** button and select the **Edit VS** link.
4. Change CPU core/priority and RAM values. You can also edit the **Time Zone** parameter for all Windows KVM and Xen virtual servers.

*For VSs based on KVM Compute resources only, providing the Enable CPU topology permission is switched on for the user:*

- Change the number of CPU sockets.
Setting the correct amount of CPU sockets

- Set the total amount of virtualized CPUs and the number of sockets.
- The value of cores_per_socket will be calculated automatically by the formula vCPUs = cpu_sockets x cores_per_socket.
- Thus, if you set the vCPU value 8, and the CPU sockets 2, this means that the cores_per_socket value will be set 4.

After you edit the server's time zone, you need to stop and then start up the VS.
Currently, the time zone is set at the Compute resource side only. Therefore, users need to set the target time zone inside a Windows VS manually. Setting correct time zone at the Compute resource side helps to keep correct time inside a VS after starting it if time synchronization is not completed for some reason.

After changing VS resources you can see two prices per this VS per hour, depending on VS power status (on/off).

Please pay attention that when you resize a VS, the price is changed, and the new price is not applied immediately. It takes about 5 minutes to take effect.

5. Click the Save button.
If the VS template allows resize without reboot, the resize should be completed automatically: you will be returned to the VS details screen and see a message indicating the resize was successful. If the template does not allow this, you will be asked to confirm that the VS will need rebooting so that the resize can take place.
8.1.12 Rebuild/Build Virtual Server Manually

To build/rebuild virtual server *Build/rebuild virtual server* and *Manage public templates* permissions must be enabled.

If you haven’t checked the **Build Virtual Server** option during the VS creation process, you will have to do this manually after the VS has been created. Building a virtual server is the process of allocating physical resources to that VS.

To build a virtual server manually or rebuild the VS on the same (or another) template:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you’re interested in.
3. On the screen that appears, click the **Tools** button and then click **Rebuild Virtual Server**.
4. On the screen that pops up, use the drop-down menu to choose a template with which to build the VS.

   **Currently it is not possible to rebuild a Linux-based virtual server to FreeBSD templates.**

5. Move the **Start VS after rebuild** slider to the right if you want to have your VS started automatically after it is built.

6. Select the following options if you selected Windows or Linux **Windows**
   - **Windows Licensing type** - KMS, MAK, or OWN
   - **Licensing key** - input license if you selected OWN licensing type
   - **Select Server** for KMS licensing type

7. Click the **Rebuild Virtual Server** button to finish.

   **To rebuild (i.e. re-format and re-install) this virtual server, use the drop-down menu to choose a template to re-build it from, then click the Rebuild Virtual Server button. WARNING: all data will be lost.**

**Template**  
CentOS 5.11 x64

**Start VS after rebuild**

|滑块|滑动到右边|自动启动虚拟机|

**Rebuild Virtual Server**

**After you rebuild your template all data will be lost!**
8.1.13 Migrate Virtual Server

You can migrate virtual servers using a *hot* or *cold* migration method:

- **Hot migration** is a live migration of a virtual server with or without disks and NICs between compute resources that share common data stores or data store zones.
- **Cold migration** is a migration of virtual servers with disks between compute resources with local storage or across compute zones.

On this page:

- **Hot Migration**
  - Hot Migration Between Compute Resources
  - Full Hot Migration

- **Cold Migration**

8.1.13.1 Hot Migration

You can migrate an online virtual server from one compute resource to another compute resource that are both utilizing local/shared/IS storage or across zones. There are two types of hot migration:

- **Compute Resource** - a migration of a virtual server from one compute resource to another.
- **Full Migrate** - a migration of a virtual server with or without disks and NICs between compute resources, data stores, and networks.

8.1.13.1.1 Hot Migration Between Compute Resources

Before you begin, take into consideration the following:

- Check if your Windows template supports hot migration at the Windows Templates.
- If both source and destination compute resources have backup IP addresses, VS migration will be performed using those backup IP addresses as an alternative network for traffic. If migration fails for any reason, it will be retried using destination compute resource IP address in management network.
- Migrating a virtual server to a compute resource with *Any* operating system type has the next implications. It won't be possible to set the Windows Only type for a compute resource, if there are any Linux or FreeBSD VSs residing on it. Likewise, it won't be possible to set the Non Windows type for a compute resource, if there are Windows-based VSs residing on it.

To hot migrate a virtual server:

1. Go to your Control Panel > Cloud > Virtual Servers.
2. Click a label of a virtual server that you want to migrate.
3. Click the Tools button and click the Migrate Virtual Server button.
4. In the Migration Type box, select Compute Resource and click Next.
5. Select a Target compute resource from the box and click Next.
6. At the final step of the wizard, you can see the migration summary and select the following checkbox:
   - Cold-migrate when hot-migration fails - select the check box to apply cold migration in case of the hot migration failure

7. When you are finished, click the Submit button.

8.1.13.1.2 Full Hot Migration

Before you begin, take into consideration the following:

- The hot migration is applicable only to virtual servers running on CentOS 7 KVM compute resources and virtual servers can be migrated only to CentOS 7 KVM compute resources.
- You can hot migrate a virtual server NIC to a VXLAN/VLAN management network that is not shared by the source and destination compute resources. When you migrate a NIC to another network, only one IP address assigned to a virtual server is migrated.
- The source and destination compute resources and data stores should be in the same location. Migration between different locations is not possible.
- The bandwidth from compute resource to compute resource should be sufficient enough to allow transferring of virtual servers.
- Hot migration is applicable to virtual servers with local storage. Be aware that migration will take much more time if you want to perform it between shared data stores.
- If both source and destination compute resources have backup IP addresses, VS migration will be performed using those backup IP addresses as an alternative network for traffic. If migration fails for any reason, it will be retried using destination compute resource IP address in management network.
- Be aware that disk migration is better than full VS migration in case you want to migrate disks within the same compute zone and if the advanced backup scheme is used. Such scenario is applicable only to shared data stores within the same compute zone.
- The hot migration is available only if a virtual server is online and your Quick Emulator (QEMU) version is later than 2.6.

To run a full hot migration of a virtual server:

1. Go to your Control Panel > Cloud > Virtual Servers.
2. Click a label of a virtual server that you want to migrate.
3. Click the Tools button and click the Migrate Virtual Server button.
4. In the Migration Type box, select Full Migrate (Hot).
5. Select Migrate Storage and/or Migrate Networks and click Next.
6. Select the destinations to which to migrate a virtual server:

   **Compute Resources**
   - Target compute zone - select a destination compute zone
   - Target compute resource - select a destination compute resource
   Click Next to proceed to the following step.

   **Storage Resources**
   - Target data store for disk - select a destination data store for each disk. The list includes available data stores associated with the compute zone and compute resource that you selected earlier.
   Click Next to proceed to the following step.
Network Resources

- Target network - select a destination network for each network interface
- Target IP net - select an IP net in a destination network
- Target IP range - select an IP range in a destination network
- Select and assign IP address - select an IP address to assign to a virtual server.

You can click Free IPs or My IPs to select from all free IP addresses or your own IP addresses.
Click Next to proceed to the following step.

7. At the final step of the wizard, you can see the migration summary. Click Submit to start the migration.

- Hot migration is not performed if a virtual server has temporary disks (attached to or from other virtual server).
- Hot migration is not performed for Integrated Storage data stores if any of the disks has snapshots.
- Hot migration is not applicable for federated virtual servers that are built in compute zones submitted to the Marketplace.
- If you have local backups on the source compute resource, please move them manually to a target compute resource or backup server.
- If you change the compute resource or data store zone, the billing will be changed according to the prices set for that new zone in the bucket.
- Go to Admin > Settings > Configuration > Defaults > Migration options, if you want to set migration rate limit and limit of transactions which can be run simultaneously on the target compute resource when migrating a VS.
- The following disk migration scenarios are applicable:
  - From LVM data store to LVM data store
  - From Integrated Storage data store to Integrated Storage data store
  - From LVM data store to Integrated Storage data store
  - From Integrated Storage data store to LVM data store
  - Hot migration is not applicable for SolidFire storage.
- Disks that are migrated from one LVM data store to another are renamed in the source data store. In case of Integrated Storage, disks remain with the same name at source data store and are marked as offline zombie disks. You need to delete them manually, otherwise, you will get an error during backward migration.
Cold migration enables you to migrate virtual servers with or without disks and NICs between compute resources with local storage or across compute zones. There are several prerequisites for the cold migration:

- You should shut down a virtual server before performing migration.
- You can cold migrate a virtual server NIC to a VXLAN/VLAN management network that is not shared by the source and destination compute resources. When you migrate a NIC to another network, only one IP address assigned to a virtual server is migrated.
- The source and destination compute resources and data stores should be in the same location. Migration between locations is not possible.
- The bandwidth from compute resource to compute resource should be sufficient enough to allow transferring of virtual servers.
- Cold migration is applicable to virtual servers with local storage. Be aware that migration will take more time if you want to perform it between shared data stores.
- Be aware that disk migration is better than full VS migration in case you want to migrate the disks within the same compute zone and if the advanced backup scheme is used. Such scenario is applicable only to the shared data stores within the same compute zone.

To cold migrate a virtual server with disks:

1. Go to your Control Panel > Cloud > Virtual Servers.
2. Click a label of a virtual server that you want to migrate.
3. Click the Tools button and click the Migrate Virtual Server button.
4. In the Migration Type box, select Full Migrate (Cold).
5. Select Migrate Storage and/or Migrate Networks and click Next.
6. Select the destinations to which to migrate a virtual server:

   **Compute Resources**

   - Target compute zone - select a destination compute zone
   - Target compute resource - select a destination compute resource
     Click Next to proceed to the following step.

   **Storage Resources**

   - Target data store for disk - select a destination data store for each disk. The list includes available data stores associated with the compute zone and compute resource that you selected earlier.
     Click Next to proceed to the following step.

   **Network Resources**

   - Target network - select a destination network for each network interface
   - Target IP net - select an IP net in a destination network
   - Target IP range - select an IP range in a destination network
   - Select and assign IP address - select an IP address to assign to a virtual server.
     You can click Free IPs or My IPs to select from all free IP addresses or your own IP
addresses. Click Next to proceed to the following step.

7. At the final step of the wizard, you can see the migration summary. Click Submit to start the migration.

- Cold migration is not applicable for federated virtual servers that are built in compute zones submitted to the Marketplace.
- You cannot migrate a virtual server from a compute resource that is offline.
- If you have local backups on source compute resource, please move them manually to a destination compute resource or backup server.
- If you change the compute resource or data store zone, the billing will be changed according to the prices set for that new zone in the bucket. The new estimated price per hour for a VS is displayed at the bottom of the VS migration screen.
- Go to Admin > Settings > Configuration > Defaults > Migration options, if you want to set migration rate limit and limit of transactions which can be run simultaneously on the target compute resource when migrating a VS.
- The following disk migration scenarios are applicable:
  - From LVM data store to LVM data store
  - From Integrated Storage data store to Integrated Storage data store
  - From LVM data store to Integrated Storage data store
  - From Integrated Storage data store to LVM data store
- Cold migration is not applicable for SolidFire data stores.
- Disks that are migrated from one LVM data store to another will be renamed in the source data store. In case of Integrated Storage, disks will remain with the same name in the source data store and will be marked as offline zombie disks. You need to check if the transaction is completed and delete them manually, otherwise, you will get an error during the backward migration.

8.1.14 Clone Virtual Server

You can create a clone based on the same resources as the origin virtual server. To be able to clone virtual servers, you need to have the Clone own virtual servers permission enabled. The cloned virtual server inherits resources from the origin as follows.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Cloned Virtual Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Properties - owner, hostname, password, and label.</td>
<td>The same as the origin virtual server with Clone in the label, for example, <strong>Clone Origin Label</strong>.</td>
</tr>
</tbody>
</table>
### Resource Cloned Virtual Server

- **Compute, data store, and network resources & zones**
  - The same as the origin virtual server. If there are no available resources on the same data store, network, and compute resource, you cannot clone a virtual server.
- **Recipes, recipe variables, and service add-ons**
- **Firewall rules**

**IP address**
- A random IP address is assigned from an IP range in the origin network.

**Swap disk**
- A new swap disk is created on the cloned virtual server.

**Backups**
- The backups of the origin virtual server are not cloned.

---

**To clone a virtual server, follow the next procedure:**

1. Go to your Control Panel > **Cloud** > **Virtual Servers**.
2. Click a label of the virtual server that you want to clone.
3. Click **Tools** and then click **Clone Virtual Server**.
4. In the pop-up box, click **Clone Virtual Server** to confirm the action.

After you confirm the action, several transactions are run to complete the cloning process. You can check a status of each transaction in **Activity Log** of the virtual server. After the virtual server is cloned, it is powered off until you start it.

### 8.1.15 Autoscale Virtual Server

VS autoscaling allows you to change the RAM, CPU and disk size settings of a virtual server automatically. VS resources scaling is based on rules you specify. For example, you can set up a rule that will add 1000MB of memory to a VS if RAM usage has been above 90% for the last 10 minutes - but add no more than 5000MB in total in 24 hours. You can set autoscaling down settings alongside with autoscaling up.

- **For Linux-based VSs only.**
- **Disk usage autoscaling is applicable for VS primary disk only.**
- If the VS is based on a template that allows resizing without reboot - see the **Edit Virtual Server** section – then virtual server RAM and CPU will be increased without rebooting the VS. Disk space autoscaling requires a VS reboot.
- If you autoscale a VS’s memory to a value greater than current VS RAM x 16 (which is a max_memory parameter in a configuration file and database), the VS will be rebooted anyway, regardless of the template it is built on.
- **Make sure a VS can be reached via SSH. Otherwise, the autoscaling**
client installation will fail.

- Starting with version 4.2, OnApp uses Zabbix for autoscaling. Monitis will be used for autoscaling of servers built using OnApp versions previous to 4.2 until you switch autoscaling off for such server(s). If you decide to switch autoscaling back on, autoscaling will be implemented using Zabbix. Zabbix also will be used for autoscaling of newly created VSs.

- Note that Monitis support for OnApp autoscaling came to its end of life on June 30th, 2019 and is now unavailable for use.

To configure autoscaling settings:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the appropriate VS.
3. On the page that follows, click the Overview tab, and then click Autoscaling.
4. Press the required tab - Memory Usage, Disk Usage or CPU Usage - to see the statistics for each type of resources.
5. Below you will see UP and DOWN autoscaling options. Move the slider to the right to add the autoscaling rule or move it to the left to remove the rule.
6. Add autoscaling rules as explained below:

   Set autoscale up options:
If RAM usage is above \(X\)% for a specific time period, add \(Y\) MB – but no more than \(Z\) MB in a 24 hour period.

If CPU usage is above \(X\)% for a specific time period, add \(Y\)% - but no more than \(Z\)% in a 24 hour period.

If disk usage is above \(X\)% for a specific time period, add \(Y\) GB - but no more than \(Z\) GB in a 24 hour period.

Set autoscale down options:
- If RAM usage is below \(X\)% for a specific time period, remove \(Y\) MB.
- If CPU usage is below \(X\)% for a specific time period, remove \(Y\)%.
- If disk usage is below \(X\)% for a specific time period, remove \(Y\) GB.

7. Click **Apply**.

Clicking the **Apply** button does not activate autoscaling if the **Autoscale** slider at [VS overview page](#) is disabled. You can configure autoscaling rules, press the **Apply** button, these rules will be saved and will start working only after the **Autoscale** slider at VS overview page is enabled. Also you can disable the **Autoscale** slider, autoscaling will stop working, but the configuration of rules will be saved in case you will want to activate them in future.

### 8.1.16 Set VIP Status for Virtual Server

If a compute resource fails or reboots, the system migrates virtual servers to another compute resource, one VS at a time. The order VSs are migrated in is random. However, you can give a virtual server "VIP" status, and this will give that VS priority in the migration queue.

To set or remove VIP status for a VS:
1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Use the **VIP** button next to a required virtual server to change its VIP status.

### 8.1.17 Segregate Virtual Server

If required, you can instruct OnApp to make sure a VS is never booted on the same compute resource as another specific VS. This may be important if, for example, you have two name servers or a load balanced web server, and you need to keep VSs on separate physical servers.

To isolate one VS from another:
1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you want to segregate.
3. On the screen that appears, click the **Tools** button, then click **Segregate Virtual Server**.
4. In the dialogue box that pops up, use the drop-down menu to choose a VS you want to keep away from.

5. Click the **Segregate VS** button to finish.

### 8.1.18 Delete Virtual Server

Shut down the virtual server before destroying it. If you are deleting a VS that is running, the VS will be deleted after the time set in Timeout Before Shutting Down VSs configuration parameter.

To remove the virtual server from the cloud:

1. Go to your Control Panel > **Cloud > Virtual Servers** menu.
2. On the screen that appears, you'll see the list of all virtual servers in the cloud. Click the label of the virtual server you want to delete.
3. On the virtual server’s screen, click the **Tools** button, then select **Delete Virtual Server**.

4. Move the **Move Last Backup to My Templates if it is present** slider to the right if you want to save the last VS’s backup as a template.

5. Move the **Destroy All Existing Backups** slider to the right if you want to remove all existing backups of this virtual server.

6. Click the **Destroy** button.

**IMPORTANT:**
You won't be able to restore a virtual server after deleting it.

Deleting a virtual server removes all data stored on that virtual server. To save the data stored on the virtual server, back up your virtual server and tick the **Destroy All Existing Backups** box when following the instructions described in this section.

To delete a virtual server together with its backups, the user needs to have the *Destroy any backup* or *Destroy own backup* permission enabled. Otherwise, the backups of the VS deleted by the user will remain in the system.

### 8.1.19 Virtual Server Networks

The Networking menu in the Virtual Servers menu enables you to manage network interfaces, allocate IP addresses and set firewall rules for virtual servers.

#### 8.1.19.1 Configure Virtual Server Network Interface

The **Networking > Network Interfaces** menu shows the virtual network interfaces allocated to this VS. Network interfaces join the physical network to the VS. When you create a VS a network interface is added automatically. This network interface will be assigned to the existing physical network using a spare IP (IPv4) and will be set primary by default.

OnApp supports IPv4 and IPv6. Since not every application supports IPv6, at least one IPv4 address must be allocated to a VS's primary network interface.

To see the list of all network interfaces allocated to the VS:

1. Go to your Control Panel > **Cloud > Virtual Servers** menu.
2. Click the label of the virtual server you're interested in.
3. Click the **Networking** tab, then click **Network Interfaces**.
4. On the page that follows you will see the following fields:

   - **Interface** – optional label of the network interface.
   - **Network join** – name of the network and a compute resource or compute zone this network is joined to.
   - **Port speed** – the speed set to the interface.
   - **Primary interface** – indication whether the interface is primary or not.

Here you can also view **Interface Usage**, Edit and Delete network interface (using icon controls) and Add a new network interface using the button at the bottom of the screen.

To add a network interface:

1. Go to your Control Panel > **Cloud > Virtual Servers** menu.
2. Click the label of the virtual server you’re interested in.
3. Click the **Networking** tab, then click **Network Interfaces**.
4. Click the **Add New Network Interface** button at the bottom of the screen.

![Image of network interface addition](image)

5. On the screen that appears, input values for the following parameters:
   - **Label** – a human-friendly name for the new interface.
   - **Physical Network** – choose a network join from the drop-down menu, which lists network joins assigned to the compute resource/compute zone on which the VS runs).
   - **Port speed** – set port speed in Mbps, or make it unlimited.
6. Click the **Submit** button.

To edit network interface label, port speed or set it as primary (if none is marked as primary), click the **Edit** icon next to the appropriate network interface. After editing the port speed, the virtual server should be power cycled for the change to take effect.

To delete a network interface, click the **Delete** icon next to the interface you want to delete.

- To run the VS, at least one network interface with an assigned IP address (or addresses) is required!
- To allocate another physical network, add a new network interface.
- In case of network interface replacement for Windows VSs running on Xen compute resources, the user has to add new network interface, rebuild network, then remove the old network interface and perform network rebuild again.

8.1.19.2 Rebuild Virtual Server Network
To rebuild a network join, added to the virtual server (required after allocating new IP addresses):

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of a required VS.
3. On the screen that appears, click the **Tools** button, then click **Rebuild Network**.

![Screenshot of OnApp Cloud interface showing the Tools button and Rebuild Network option](image)

4. In the pop-up window, move the **Force Reboot** slider to the right, then select the VS shutdown type.

   During rebuild network, the system tries to reach VS's network interface without rebooting virtual server. Then, if it is not possible, transaction will quit. Force reboot action allows to rebuild VS network with reboot action if live rebuild is impossible. In case the force reboot option is disabled and system can not enter the virtual server, the network rebuild operation will fail.

5. Move the **Required Startup** slider to the right to start up a VS when you're rebuilding network of a powered off VS.

6. Click the **Rebuild Network** button.
In case of network interface replacement for Windows VSs running on Xen compute resources, the user has to add new network interface, rebuild network, then remove the old network interface and perform network rebuild again.

8.1.19.3  Set Virtual Server Firewall Rules
With OnApp you can set firewall rules for the network interfaces of virtual servers. There are two types of firewall rule:

- **ACCEPT** – defines the packets that will be accepted by the firewall
- **DROP** – define the packets that will be rejected by the firewall

Ensure that the following permissions are enabled before setting firewall rules for your virtual server:

- Create own firewall rules
- Destroy own firewall rules
- Read own firewall rules
- Update own firewall rules
- Update own virtual server
- Read own virtual server

You can not apply firewall rules to virtual servers which are parts of a blueprint.

You can set the following:

- **add a specific firewall rule** - you can configure a firewall rule with specific parameters (source, destination port, protocol type etc.)
- **set default firewall rules** - you can set default firewall rules for an entire network interface

8.1.19.3.1  Add a specific firewall rule
To configure a firewall rule:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the VS for which you want to configure a firewall rule.
3. Click the **Networking** tab and then click **Firewall**.
4. On the page that appears, set the following:
   a. Choose the network interface.
   b. Specify if the rule defines requests that should be accepted or dropped.
   c. Set the IP address for which this rule is active.
      - Leave the empty field to apply this rule to all IPs
      - Enter hyphen-separated IPs to apply the rule to an IP range (e.g. 192.168.1.1-192.168.1.10)
      - Enter the IPs with slash to apply the rule to CIDR (e.g. 192.168.1.1/24)
d. Set the port for which this rule will be effective.
   - Leave the empty field to apply the rule to all ports
   - Enter colon-separated ports to apply the rule to a port range (e.g. 1024:1028)
   - Enter comma-separated ports to apply the rule to the list of ports (e.g. 80,443,21)

e. Choose the protocol (TCP, UDP or ICMP).

5. Save the rule by clicking the **Add Rule** button. The rule will be saved in the UI, but the transaction won’t be started until you click the **Apply Firewall Rules** button.

6. To start the transaction which runs firewall rules for a VS, click **Apply firewall rules** button.

7. Use **Up** and **Down** arrow buttons in the left column to change firewall rule position.

8. To edit or delete a firewall rule click the appropriate icon in the last column.

8.1.19.3.2 Default firewall rules

To set default firewall rules for a network interface:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the VS for which you want to configure a firewall rule.
3. Click the **Networking** tab, then click **Firewall**.
4. On the page that appears, go to Default firewall rules section.
5. Choose **ACCEPT** or **DROP** command next to the network interface and click **Save Default Firewall Rules**. The rule will be saved in the UI, but the transaction won’t be started until you click the **Apply Firewall Rules** button.
Example:
The Int1 ACCEPT 122.158.111.21 22 TCP firewall rule means that the Int1 network interface will accept all requests and packets addressed from 122.158.111.21 using the TCP protocol on port 22.
The Int2 DROP 122.158.111.21 22 UDP firewall rule means that the Int2 network interface will reject all requests and packets from 122.158.111.21 using the UDP protocol on port 22.

If you reboot a Xen-based VS from the console, the firewall rules for this VS will be lost, and you will need to update the firewall rules again.

8.1.19.4 Virtual Server IP Addresses
In the Networking > IP Addresses tab you can find the list of assigned IP addresses, allocate new IP addresses and rebuild a network.

To allocate a new IP Address to the VS:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Networking tab, then click IP Addresses.
4. Click the Allocate New IP Address button.
5. Select a network interface from the drop-down menu (only the network interfaces you added to the VS will be available)
6. Select an IP address from the IP Pool associated with the network interface. You may select an IP address that's already assigned to a VS, but only one VS should be used as primary.
   Use Please show me used IP Pool, Show only my IPs and Show only IPv6 checkboxes to narrow the list of IP in the drop-down list.
7. Click the Add IP Address button.
8. Click the Rebuild Network button to rebuild the network.

- You must rebuild the network after making changes to IP address allocations.
- Currently, it is possible to assign only up to 320 IPs to an Ubuntu virtual server.
- The external IP address can be managed by API only. If you want to add an external IP address, refer to Add/Edit External IP Address section of API Guide.

To remove an IP address from a VS:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Networking > IP Addresses tab.
4. Click the Delete icon next to the IP address you want to delete.
5. In the pop up window that appears:
Choose **Delete with Reboot** option if you want to reboot a VS and rebuild the network immediately after deleting the IP address. After choosing the Delete with Reboot option you will be redirected to the VS's Overview page.

Choose **Delete without Reboot** option if you don't want to reboot a VS. In this case to apply the changes, you will have to reboot the VS additionally.

**You can't delete an IP address that is in use.**

---

### 8.1.19.5 Display Network Speed for Network Interfaces on Virtual Server Page

The main **Virtual Servers** screen displays the network speed of each VS's primary network interface. To see the speed of all interfaces assigned to a VS:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you are interested in.
3. Click the **Networking** > **Network Interfaces** tab.
4. On the screen that appears, the **Port Speed** column shows the network speed of the network interface.

![Network Interfaces](image)

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### 8.1.19.6 Edit Virtual Server Network Speed

To edit a virtual server's network speed:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you want to change.
3. Go to the **Network** > **Network Interfaces**.
4. In the last column click the **Edit** button.

5. Change the port speed.

6. Click the **Submit** button to save changes.

### 8.1.20 Virtual Server Disks

Virtual server storage is provided by disks. A disk is a partition of a data store that is allocated to a specific virtual server. Disks can be assigned as standard or swap disks (there are no swap disks for Windows based templates). They can also be set as primary (that is, the disk from which an OS will boot).

You can also utilize incremental backups. For details, see **Virtual Server Backups** section of this guide.

Managing disks for the entire cloud is handled through the Control Panel's Settings menu. Disks for individual virtual servers are managed through the Control Panel's **Virtual Servers** menu, where you can:

- See the list of disks allocated to this VS
- Add a new disk
- Resize a disk
- Migrate a disk
- **Virtual Server Disk IOPS Statistics**
- Delete a disk
- Back up disks
- View disk backup schedules
- Schedule disk for backups
8.1.20.1 Add Disks to Virtual Servers

Adding a disk to a virtual server will require that VS should be rebooted. If a VS is running when you try to add a new disk to it, you’ll be asked to confirm the reboot. To add a disk to a virtual server:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click a VS’s label to open its details screen.
3. Click the **Storage** tab > **Disks**.
4. Click the "+" button or the **Create Disk** button.
5. Fill the details:
   - Specify disk label.
   - Choose the data store to create a disk on from the drop-down list.
   - Move the slider to the right to specify the desired disk size.
   - Move the **Hot Attach** slider to the right if you want to enable disk hot attaching. In this case virtual server will not be stopped when adding a disk. Prerequisite: virtual server template should support virtio virtualization and Linux OS. Hot attach option is only available for KVM 6/ CentOS 6 virtual servers.
   - Move the **Swap Space** slider to the right if this disk is swap space.
   - Move the **Require Format Disk** slider to the right if this disk requires formatting.

The disk size should not exceed 2 TB when a new disk is added. You can later resize the disk if you need it to be larger than 2 TB.
- Move the **Add to Linux FSTAB** slider to the right if the disk should be added to Linux FSTAB (for Linux virtual servers).

- Specify its mount point. The maximum length of a Mount Point is 256 characters. Spaces are not allowed. No more than one slash is allowed. If the mount point is not specified the default mount point will be used:
  
  ```
  /mnt/onapp-disk-#{disk.identifier}
  ```

- Tick the **Add to FreeBSD FSTAB** checkbox if the disk should be added to FreeBSD FSTAB (for FreeBSD virtual servers).

- Indicate the **file system** - ext3, ext4 or xfs - for Linux based VS.

6. Click the **Add Disk** button to finish.

**Restrictions:**

- If you choose a Solidfire data store, the minimum disk size will be regulated by Solidfire Data Store Zone settings.

- If virtual server and the control panel server belong to different networks, the hot attach transaction will fail.

- If an additional disk has been created without the **require format disk** option and formatted/partitioned in another way, resize disk action may work incorrectly. Use the **require format disk** option when creating an additional disk, otherwise use disk resize option at your own risk.

- To be able to take incremental backups for virtual server’s disk, you must mount this disk to FSTAB (either Linux or FreeBSD) and specify the proper mount point manually.

- You cannot back up Swap disks.

- When you add a new disk to a virtual server, it automatically becomes available to that server.

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**8.1.20.2 Edit Virtual Server Disks**

**8.1.20.2.1 Primary and Swap disks**

For primary and swap (Linux, FreeBSD) disks you may only change the label and the size. You can easily resize disks when needed. The resize will fail if your current usage is greater than the new size you request. Note, that any changes on disk size will lead to reboot of your VS.

To change disk size:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Make sure your virtual server is powered off, then click its label to open its details screen.
3. Click the **Storage** tab > **Disks**.
4. Click the **Actions** button next to the disk you want to change, then click the **Edit** link.
5. Enter a new disk label and size in GB in the fields provided.

6. Click the **Save Disk** button.

- You cannot decrease size of Integrated Storage data store disks.
- You cannot decrease disk size for Windows-based and FreeBSD-based virtual servers. Only the increase disk size option is available.
- You cannot resize the primary disk for FreeBSD-based virtual servers.
- Decreasing disk size for Linux-based virtual servers may lead to filesystem inconsistencies. Make sure you have current backups before
proceeding.

- If disk file system can not be detected (disk has more than one partition or some special partition table/file system), you can only increase disk physical volume size.
- If you start disk resize and then decide to cancel it, there can be dangerous side effects including file system corruption.

8.1.20.2.2 New disks
For new disks - those which were added after the virtual server was created - you can edit the following:

<table>
<thead>
<tr>
<th>Linux</th>
<th>Windows</th>
<th>FreeBSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Label</td>
<td>• Label</td>
<td>• Label</td>
</tr>
<tr>
<td>• Size</td>
<td>• Size</td>
<td>• Size</td>
</tr>
<tr>
<td>• Require format</td>
<td>• Require format</td>
<td>• Require format</td>
</tr>
<tr>
<td>• Add to Linux fstab</td>
<td>• Add to FreeBSD fstab</td>
<td></td>
</tr>
<tr>
<td>• Mount point</td>
<td></td>
<td>• Mount point</td>
</tr>
<tr>
<td>• File system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.1.20.3 Migrate Disks
OnApp allows hot and cold migration of virtual server disks:

- Hot migration - the migration of disks between compute resources that share common data stores (or data store zones)
- Cold migration - the migration of disks between compute resources with local storage or across compute zones

You can migrate disks of your virtual servers to other data stores, which are allocated to the same Compute resource. Unlike VS migration – disk migration requires the reboot of the VS (despite the template it is based on).

- The hot migration will work only when the VS is running on CentOs 7 KVM compute resources, and they can be migrated only to CentOs 7 KVM compute resources.
- The hot migration option appears only if the VS is online and your Quick Emulator (QEMU) version is later than 2.6
To migrate a disk:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of your virtual server to open its details screen.
3. Click the Storage > Disks.
4. Click the Actions button next to the disk you want to move to another data store, then click the Migrate button.
5. On the screen that appears, select the following options:
   - **Type** - select the cold or hot migration type
   - **Data store** - select the target data store to migrate the disk
6. Click the Start Migrate button.

- We recommend to create a disk backup before starting the migration process to avoid potential data loss.
- It is recommended to take a backup of a virtual server before migrating the VS disk. In case of any issues during VS disk migration, you will be able to restore the VS from the backup.
- You can only migrate disks to data stores in data store zones assigned to your bucket.
- You cannot migrate a disk to a data store with less capacity than the disk size.
- Integrated Storage disks cannot be migrated if they have snapshots.
- If you move an 850GB disk between aggregates with 10GB actual usage, the 'dd' image of the local volume manager will take 850GB space, because the entire local volume manager is copied, including zero 'dspace which may not be able to be recovered.
- If required, you can change the block size which is used during disk migration at Control Panel > Admin > Settings > Configuration by editing the Block Size (MB) parameter.
8.1.20.4 Assign Disk to VS

Now you can temporarily assign a disk to another virtual server that has the same data store in use. The disk will be attached to the target VS, but it is necessary to reboot the target VS and mount the disk manually to make it available. Later you can re-assign the disk back to the primary VS at any appropriate moment.

- Ensure that the Assign own disk to VS permission is on before assigning disk to another VS. For more information refer to the Default Permissions for User Role section of this guide.
- Assigning disk functionality is not applicable for swap disks.
- Both target and source VSs cannot be deleted as soon as the disk is assigned to a new VS. To delete target and source VSs, as well as the disk, it is required to re-assign a disk to a source VS.

To assign a disk to another VS:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of a virtual server to open its details screen.
3. Click the Storage > Disks.
4. Click the Actions button next to the disk you want to assign to another VS, then click the Assign to VS button.
5. On the screen that appears, select a target VS from a drop-down box.
6. Click Assign.

Be aware, that the source VS will be automatically powered off after assigning a disk to another VS.

To re-assign the disk back to the primary VS:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of a virtual server to open its details screen.
3. Click the Storage > Disks.
4. Click the **Actions** button next to the disk you want to re-assign to source VS, then click the **Assign back** button. Confirm the action.

If the target VS is running on XEN compute resource, it will be automatically powered off after re-assigning a disk back to the source VS.

8.1.20.5 Delete Virtual Server Disks

To delete a disk:
1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Make sure your virtual server is powered off, then click its label to open its details screen.
3. Click the **Storage** > **Disks** tab.
4. Click the **Actions** button next to the disk you want to delete, then click **Delete**.

5. In the pop-up window, move the **Force Reboot** slider to the right, then select the VS shutdown type.
6. Move the **Required Startup** slider to the right to start up the VS automatically after the network is rebuilt.

**Steps 5 and 6 apply to disks of VSS that are on.**

7. Click the **Destroy Disk** button.

**This will schedule the "destroy disk" transaction.**
8.1.21 Virtual Server Backups

Backups are used for copying and archiving target data (target is either a disk or a virtual server as a single whole of all disks used).

- **Images** menu lists normal backups of a virtual server
- **Incremental** menu list virtual server’s incremental backups
- **Schedules** menu allows you to schedule automatic for virtual server. See schedule section of this guide for details.

OnApp supports two backup types: normal and incremental:

- **Normal** - simple method of taking backups by making full copy of target data and storing it in an archive.

  Ensure that you do not use XFS or other filesystems not supported by OnApp for Linux backups as OnApp will address them as ext3/4 filesystems.

- **Incremental** - advanced method of taking backups. During the incremental backup, only the changes made after the last backup are archived instead of backing up the whole target. You must have dedicated backup servers configured in your cloud to be able to utilize the incremental backups functionality. Incremental backups are enabled via **Settings > Admin > Configuration > Backups/Templates** menu.

  It is not possible to take incremental backups if you are using location group functionality without a backup server added to the group - the following error message will appear:

  "Backup cannot be made at this time: This disk cannot be backed up, check Location Group settings."

  This issue will be fixed in next releases. As a workaround, add an empty backup server zone to your location group.

Each backup type can be taken in two ways:

- **Manually** - the user logs into OnApp CP and clicks the “Take backup” button.
- **Automatically** - the user enables backup schedule (daily, weekly, monthly, yearly). To enable auto-backups for virtual servers that support incremental backups which used auto-backups option before the upgrade, re-enable automatic backups by switching them off and on again.
If you are using incremental backups option, you should either enable dedicated backup servers in your cloud or share the backups and templates folders (paths) between your compute resources. SSH file transfer option will be skipped for virtual servers using incremental backups. Existing full backups will be still accessible via `Backups > Images` menu.

### 8.1.21.1 How do incremental backups work?

For example, we have a disk with three files:

- File1 - 4Gb
- File2 - 2Gb
- File3 - 3Gb

The first incremental backup will be 9 GB (sum of all files). If you decide to take another incremental backup soon thereafter, the backup size will be equal to 0, as the files have not been changed since the first backup (if your backup has complicated directory structure, it could be more than 0, as file system could store some system data).

Then:

- If the user decides to delete File2, the target size will now be 7Gb. The subsequent incremental backup size will be 0, as new data has not been added.

- If the user adds File4 of 4 GB size, the subsequent incremental backup will equal 4 GB (the size of new data added).

- If the user increases File3 disk size to 6 GB, the subsequent incremental backup size will equal 6 GB, although the target is increased by 3 GB. This happens because the incremental system takes the update of the existing file as the deletion of the existing file and adding the new file with the same name (the first version of File3 has been deleted and the new one with 6GB size has been added).

Backups can be saved either to a compute resource or to a dedicated backup server. When saving a backup, the system calculates if user has enough physical/ bucket resources to save a backup in the selected destination.

When saving a backup to a compute resource, the system does not check if compute resource has enough disk space to save a backup and only checks if user has enough bucket limits.

When saving a backup to a dedicated backup server, the system checks both disk space and bucket limits.

Free disk size on a target must be at least equal to the disk’s size for which the backup is taken (or to a size of all VS disk for incremental backup).

In some cases (for example, if a user has scheduled several disk backups simultaneously but there’s only free space/billing limits for the first one) the system may allow taking all the backups but will not be able to save them. This will result in a system error and over-billing.

### 8.1.21.2 Backup Support by VM / Virtualization / OS

<table>
<thead>
<tr>
<th></th>
<th>Normal backup</th>
<th>Incremental backup</th>
<th>Convert to template</th>
</tr>
</thead>
<tbody>
<tr>
<td>BaremetalServer</td>
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<td>no</td>
<td>no</td>
</tr>
<tr>
<td>EdgeServer</td>
<td>no</td>
<td>no</td>
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</tr>
<tr>
<td>StorageServer</td>
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<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>
Normal backup | Incremental backup | Convert to template
--- | --- | ---
LoadBalancer | no | no | no
SmartServer | yes | yes | yes
KVM, XEN | yes | yes | yes
VMware | snapshot | no | no
Windows | yes | no | yes
*nix | yes | yes | yes
CloudBoot / IS | yes | yes | yes
SolidFire | yes | yes | yes

### 8.1.21.3 View Virtual Server Backups
To view the list of virtual server’s backups:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.

![](image)

2. Click the label of the required virtual server.
3. Click the **Backups** tab, then select the appropriate backup type:
   - Images - full backups
   - Files - incremental backups
4. On the screen that appears, you’ll see a list of virtual server backups sorted by category.
5. Click the label of the required virtual server backup to see the following tools - restore backup, delete backup, convert it to template and add/edit note:

### 8.1.21.4 Take Virtual Server Backup
To take an incremental backup:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the server you want to back up.
3. Click the **Backups** tab, then select **Files**. You’ll see a list of the disks allocated to that virtual server.
4. Click the **Actions** icon next to a disk you want to take a backup of, then click **Backup**. You’ll see a list of all the backups taken and pending for that virtual server sorted by category.
5. To take a backup, click the **Take a Backup** button at the end of the list.
PLEASE NOTE: Backups in the OnApp Control Panel are associated with a particular user instead of being associated with a virtual server. To view the list of user backups, refer to View User Backups section.

Template extraction is performed during server provisioning or taking a backup when using a particular template. To prevent template from being used in other transactions during extraction, template is locked during the extraction and unlocked on accomplishment. If other transaction tries to use the locked template, it will fail after 5 minutes of standby.

Transaction which locked template and failed, means that extracted template is broken.

Storing scheme:
- template /onapp/templates/your_template.tgz
- extracted template /onapp/backups/templates/your_template
- locked template /onapp/backups/templates/your_template.lock

8.1.21.5 Take Virtual Server Disk Backup
To back up a virtual server:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the server you want to back up.
3. Click the Storage > Disks. You’ll see a list of the disks allocated to that virtual server.
4. Click the Actions icon next to a disk you want to take a backup of, then click Backup.
You’ll see a list of all the backups taken and pending for that disk, along with the tools to restore backups, delete them, and convert them to templates.

- To make a backup, click the **Take a Backup** button at the end of the list. You may add a note and also **Force Windows Backup**

  This option for Windows virtual servers is designed as a last resort, when the backup cannot be taken due to NTFS file system problems. Switching this option will bring up a dialog box with the following message: "If you enable this option there is no guarantee that backup will be consistent."

  Select "Yes" to proceed

- To restore a backup, click **Restore** next to the backup you want to revert to.
- To convert a backup into the custom template, click **Convert to Template** next to the backup (see Create custom templates).

Backups in the OnApp Control Panel are associated with a particular user instead of being associated with a virtual server. To view the list of user backups, refer to View User Backups section.

8.1.21.6 Convert Virtual Server Backup to Template

To convert virtual server backup to template:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the required virtual server.
3. Click the **Backups** tab, then select the appropriate backup type:
   - **Images** - full backups
   - **Files** - incremental backups
4. On the screen that appears, click the Actions icon next to the backup and click Convert to Template (see Create custom templates).

8.1.21.7 Restore Virtual Server Backup
To restore a backup:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the required virtual server.
3. Click the Backups tab, then select the appropriate backup type:
   - Images - full backups
   - Files - incremental backups
4. On the screen that appears, click the Actions icon next to the backup you want to revert to and choose Restore.

   If the file system on the disk is corrupted, it won't be possible to restore the files from incremental backup. In that case, you can force a backup restore and rebuild a file system on a disk. To do this, move the Force Restore slider to the right.

5. Click the Restore Backup button.

8.1.21.8 Delete Virtual Server Backup
To delete a backup:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the required virtual server.
3. Click the Backups tab, then select the appropriate backup type:
   - Images - full backups
   - Files - incremental backups
4. On the screen that appears, click the Actions icon next to the backup you want to remove and choose Delete.

8.1.21.9 Edit Virtual Server Backup Note
To edit virtual server backup's note:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the required virtual server.
3. Click the Backups tab, then select the appropriate backup type:
   - Images - full backups
   - Files - incremental backups
4. On the screen that appears, click the Actions icon next to the required backup and choose Edit Note. Make necessary changes and click Save.

8.1.22 Virtual Server Backup Schedules
Schedules screen lists virtual servers’ scheduled backup. Depending on the backup type set in your cloud settings, schedules are created either per virtual server or per disk. To view all backup schedules in the cloud, see Schedules Settings.
8.1.22.1 View Virtual Server Backup Schedules
To view the list of backup schedules for a particular virtual server:

8.1.22.1.1 If normal backup options is selected for the cloud:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.

5. On the screen that appears, you will see the list of backup schedules along with their details:
   - **Date** - time when the schedule was created
   - **Target** - server or disk for which the schedule was created (depending on the backup type)
   - **Action** - scheduled action
   - **Frequency** - how frequently the backup will take place according to the period set. For example, frequency of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years
   - **Rotation period** - number of backups after which the first backup will be deleted

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

- **Next Start** - the date and the hour of the next backup
- **User** - user who created the backup schedule
8.1.22.1.2 If incremental backup option is selected for the cloud
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Select Backups > Schedules tab, or click Auto-backups under the Options section to view incremental backups schedules only.
4. On the screen that appears, you will see the list of backup schedules along with their details:
   - **Date** - time when the schedule was created
   - **Target** - server or disk for which the schedule was created (depending on the backup type)
   - **Action** - scheduled action
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years
   - **Rotation period** - number of backups after which the first backup will be deleted
   - **Next Start** - the date and the hour of the next backup
   - **User** - user who created the backup schedule
   - **Status** - schedule status

8.1.22.2 Create Virtual Server Backup Schedule
In addition to the system auto-backup presets, you can schedule backups of virtual servers (VS disks) as required. For example, you can set up a schedule to back up your disks once a week.

The combination of Scheduled VS backups and Auto-backup Presets provides a great deal of flexibility in the way backups are handled for the cloud, and for individual VSs. Auto-backup Presets can be applied to all new VSs added to the cloud. Scheduled VS backups enable specific backups to be scheduled for individual VSs, outside of the auto-backup pattern.
Depending on your cloud settings, you can schedule either normal or incremental backup schedules:

- Adding normal backup schedule
- Adding incremental backup schedule

8.1.22.2.1 Adding a normal backup schedule
To add a normal backup schedule:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you want to schedule a backup for.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.

5. On the screen that follows, click the New Schedule button.
6. Specify schedule details:
   - Frequency - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - Period - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - Rotation period - number of backups after which the first backup will be deleted.

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

- Start time - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).
7. Click the **Save** button to finish.

8.1.22.2.2 Adding an incremental backup schedule

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you want to schedule a backup for.
3. Click the **Backups** tab, then choose **Schedules**, or click **Auto-backups** under the Options menu to view incremental backup schedules only.
4. Click the **New Schedule** button.
5. On the screen that appears, specify new schedule's details:
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - **Rotation period** - number of backups after which the first backup will be deleted.
   - **Start time** - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).
6. Click the **Save** button to finish.

8.1.22.3 Edit Virtual Server Backup Schedule

8.1.22.3.1 To edit a normal backup schedule:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you want to schedule a backup for.
3. Click the **Storage** tab, then select **Disks**.
4. On the screen that appears, click the **Actions** button next to the disk you want to back up, then select **Schedule for Backups**.
5. Click the **Edit** icon next to a schedule to change its details.

6. Specify schedule details:
   
   o **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days.
   
   o **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   
   o **Rotation period** - number of backups after which the first backup will be deleted. Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.
   
   o **Enabled** - move the slider to enable or disable the schedule.

   For a schedule with the **Failed** status, you can move the **Enabled** slider to the right to run the schedule once again.
7. Click the **Save** button to finish.

8.1.22.3.2 To edit an incremental backup schedule:
1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you’re interested in.
3. Select **Backups** > **Schedules** tab, or click **Auto-backups** under the **Options** menu to view incremental backup schedules only.
4. Click the **Edit** icon next to a schedule to change its details:
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - **Rotation period** - number of backups after which the first backup will be deleted. This parameter is for incremental backup schedules only.
   - **Enabled** - move the slider to enable or disable the schedule
5. Click the **Save** button to save your changes.

8.1.22.4 Delete Virtual Server Backup Schedule

8.1.22.4.1 To delete a normal backup schedule:
1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you’re interested in.
3. Click the **Storage** tab, then select **Disks**.
4. On the screen that appears, click the **Actions** button next to the disk with a backup schedule, then select **Schedule for Backups**.
5. Click the **Actions** icon next to the schedule you want to remove, then choose **Delete**.

8.1.22.4.2 To delete an incremental backup schedule:
1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you’re interested in.
3. Select **Backups > Schedules** tab, or click **Auto-backups** under the **Options** section to view incremental backups schedules only.

4. On the screen that appears, you will see the list of backup schedules.

5. Click the **Actions** icon next to the schedule you want to remove, then choose **Delete**.

### 8.1.23 Virtual Server Statistics

For your convenience, the system tracks VS performance and generates statistics on:

- Virtual Server CPU Utilization
- VS Billing statistics
- Interface Usage
- Virtual Server Disk IOPS Statistics

#### 8.1.23.1 Virtual Server CPU Utilization

OnApp tracks CPU usage for virtual servers and generates charts that help analyze VS performance. The charts show the total CPU usage for all the cores of this particular VS for a specified time period.

The vertical axis shows the CPU usage percentage (CPU percentage is the core-independent quantity). The horizontal axis defines a time period.

To see CPU usage statistics:

1. Go to your Control Panel > **Cloud > Virtual Servers** menu.
2. Click the label of the virtual server you're interested in.
3. Click the **Overview tab > CPU Usage**.
4. On the screen that appears, the top chart shows CPU usage for the last 24 hours. The bottom chart shows usage for the last three months (if there is enough data). If there less data available, the chart will show utilization for the time available.
5. Tick the **Show in My Timezone** box to show bandwidth statistics according to your profile's timezone settings.
6. To zoom into a time period, click and drag in a chart. Click the **Reset Zoom** button to zoom out again.

7. You can filter the statistics by date and time - select the time period from the drop-down menu and click the **Apply** button.

To see what percentage of compute resource CPU resource a VS takes, go to your Control Panel’s **Virtual Servers** menu and click the label of the VS you’re interested in. On the screen that appears, the CPU(s)/Shares parameter displays the amount of CPU resource given to this VS.
8.1.23.2 Virtual Server Billing Statistics

OnApp has a record of all the charges applied to your VSs for the last three month period. If a virtual server was created less than three months ago, statistics are recorded for the VS's existence to date. You can view all statistics available, or those for a shorter period by setting a Start and End time.

To view billing statistics for a virtual server:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Overview > Billing Statistics tab.
4. You can filter the statistics by date and time - select the time period from the drop-down menu and click the Apply button. By default the statistics are generated for the last three months or the actual VS existence period.
5. Move the Show in my Timezone slider to the right if you want to view billing statistics according to your profile's timezone settings. By default, billing statistics is shown in UTC.
6. On the page that appears:
   - **Date** – particular date and time for the generated statistics
   - **Users** – the virtual server owner. Click the owner name to see the User Profile (user details)
   - **Virtual Servers** – the virtual server name with the total due for VS resources (CPU priority, CPUs, memory and template resources) for the point of time specified in the Date column.
   - **Network Interfaces Usage** – the total due for the network interfaces used by this VS for the point of time specified in the Date column. Click the network interface name to see its details.
   - **Disks Usage** – the list of disks assigned to this VS with the total due for the disk space resources (disk size, data read/written, reads/writes completed) for the point of time specified in the Date column. Click the disk name to see its details.
   - **Costs** – the total due for the Virtual Servers, Network Interfaces and Disks resources at the point of time specified in the Date column.

Scroll down to see Total Amount (the total due for the whole billing statistics period).

8.1.23.2.1 Save as CSV

You can save your billing statistics to a file in a CSV format. To download a CSV file with billing statistics for a selected period of time, click the Save as CSV button. The download will start automatically after you click the button.

The CSV file includes the following information:
- **stat_time** - a particular hour for which the statistics were generated
- **vs_id** - an ID of a virtual server
- **resource_category** - a resource for which the statistics were generated. The resource category can be a `disk`, `network_interface`, `compute`, `template`, `instance_package`, and `service_add_on`.
- **resource_id** - an ID of a resource
- **metric_name** - a name of a metric for which the statistics were generated. The metric can be a `disk_size`, `data_read`, `data_written`, `reads_completed`, `writes_completed`, `ip_addresses`, `rate`, `data_received`, `data_sent`, `cpu_shares`, `cpus`, `memory`, `cpu_usage`, `template`, `count` (for instance packages, templates, and service add-ons), etc.
- **usage** - the amount of used resources that can be the following:
  - GBs of disk size, Kbs of data read/written, the number of reads/writes.
  - The number of IPs, the port speed in Mb per second, the data sent and received in KBs.
  - The count for the instance package, template, and service add-on categories.
- **cost** - the total due for the VS usage for a particular hour specified in the `stat_time` field

For virtual servers created from instance packages, the resource category is `instance_package`, the metric name is `count` and the usage is "1".

### 8.1.23.3 Virtual Server Network Interface Statistics
OnApp tracks network usage for virtual servers and generates charts that help analyze network performance. To see network utilization statistics for a virtual server:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you're interested in.
3. Click the **Networking** > **Network Interfaces** tab.
4. Click the **Statistics** (chart) icon next to the network you're interested in.

5. On the screen that appears, the top chart shows bandwidth usage for the last 24 hours. The bottom chart shows usage for the last three months.
6. To zoom into a time period, click and drag in a chart. Click the **Reset zoom** button to zoom out again.

7. You can filter the statistics by date and time - select the time period from the drop-down menu and click the **Apply** button.

---

8.1.23.4 Virtual Server Disk IOPS Statistics
The system tracks IOPS (Input/Output Operations per Second) for virtual servers and generates charts that help analyze VS disk performance. The data presented in the chart are for the periods during which the statistics was gathered, typically 3 minutes. To see IOPS for a virtual server:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you're interested in.
3. Click the **Storage** > **Disks** tab.
4. Click the **Actions** button next to the required disk, and then choose **IOPS**.

5. There are four charts on the screen that appears:
   - IOPS for the last hour
   - IOPS for the last 24 hours
   - Data written/read (in Kb) for the last 24 hours
   - Data written/read (in Kb) for the last hour
6. To zoom into a time period, click and drag in a chart. Click the Reset Zoom button to zoom out again.

7. You can filter the statistics by date and time - select the time period from the drop-down menu and click the Apply button.

The OnApp API allows you to limit the Hourly IOPS and Hourly data by setting the limit=N parameter, where the N variable is the number of hours for which the charts will display the info.

8.2 ISO Virtual Servers

OnApp introduces ability to build a virtual server from ISO. Such virtual servers are based on specific ISO templates which you upload to the cloud.

- It is required that you perform additional network configuration during ISO installation. For more information, refer to Confirmation step of ISO VS creation wizard.
- Creating a server from ISO is applicable for virtual and smart servers only.
- Upload the required ISO first to the cloud before creating a server based on it.

8.2.1 View ISO Virtual Servers

On this page:
View ISO Virtual Servers
View ISO Virtual Server Details
View ISO Virtual Server Transactions and Logs
To view all virtual servers deployed in the cloud:

1. Go to your Control Panel > Cloud > Virtual Servers menu to see an overview of all virtual servers in the cloud.

2. The page that loads will show the list of VVs together with their details on OS, Disk size, RAM as well as the following:
   - **label.** Click the label to see the VS details.
   - **VIP status** (enabled or disabled). If a compute resource fails or reboots, the system migrates virtual servers to another compute resource, one VS at a time. The order VVs are migrated in is random. However, you can give a virtual server "VIP" status, and this will give that VS priority in the migration queue. Click the icon to enable/disable VIP status of a particular VS.
   - **IP addresses.** If more than one IP address is assigned to this VS, mouse over the information icon to see the list of IP addresses.
   - **compute resource.** The label of compute resource with which VS is associated. Click a compute resource label to see its details.
   - **user.** The owner of this VS. Click the user name to see the owner details.
   - **power status.** Click the on/off buttons to change the status.

3. Click the **Actions** button next to the VS for the quick access to the list of VS actions (the list of actions displayed depends on the VS status):

   1. **Reboot a VS**
   2. **Recovery reboot**
   3. **Power off a VS**
   4. **CPU usage**
   5. **Shutdown**
   6. **Start up**
   7. **Recovery start up**
   8. **Unlock**

To search for a particular virtual server, type the text you want to find in the search box and click the **Search** button.
8.2.2 View ISO Virtual Server Details

To view details of a specific virtual server:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you’re interested in.
3. The screen that appears loads the VS properties, notes, activity log and tools for managing your VS.

VS properties page gives general overview of the VS details:

- Template this VS is built on
- VIP status (on/off). Click the icon to change the status.
- Power status & On/Off/Reboot buttons.

Clicking the OFF button performs graceful shutdown and then powers off the virtual server after the timeout set in Configuration settings.

- Compute resource. Click the Compute resource name to see its details
- Location group. Click the location to view the details of the location group with which the VS is associated.
- Owner. Click the owner name to see its details.
- IP Addresses. Only the first five IP addresses are displayed on the virtual server properties page. To view the list of all virtual server IP addresses, mouse over IP addresses area or go to the Networking > IP addresses tab.
- Boot from CD - move the slider to the right to boot a VS from the location where ISOs are stored. If this slider is disabled, then VS will be booted from the disk where VS is provisioned.
- Auto-backups - move the slider to enable or disable auto-backups for this server. For more information refer to ISO Virtual Server Backup Schedules.

8.2.3 View ISO Virtual Server Transactions and Logs

The system records a detailed log of all the transactions happening to your virtual servers. The list of transactions logged by the system includes:

- Provision virtual server
• Startup virtual server
• Stop virtual server
• Resize virtual server without reboot
• Configure Operating System
• Build disk
• Resize disk
• Format disk
• Destroy disk
• Destroy virtual server
• Destroy template
• Download template
• Update firewall

To view transactions for a virtual server:
1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you're interested in.
3. The details screen for that virtual server shows recent transactions in the **Activity Log** section.

To cancel pending tasks, click the **Cancel All Pending Tasks for this virtual server** button.

You can also view the details of a particular log item by clicking its Ref number. The page that loads shows the log output and the following details:

• *date* - time in the [YYYY][MM][DD][T][hh][mm][ss]Z format
• *action* - the action name
• *status* - the action status (Complete, Warn, Pending, or Failed)
• *ref* - the log item's Ref number
• *target* - the action target
• *started at* - the time when the action was started
• *completed at* - the time when the action was completed
• *template* - template of the server the action refers to
• *compute resource* - the label of compute resource
• *initiator* - the user who initiated the action

If you want to see only the detailed output, you can hide log info with the arrow button in the upper right corner.
8.2.4 Create ISO Virtual Server

ISO virtual servers are created from the ISOs uploaded to the Control Panel and saved as specific ISO templates. The ISOs are uploaded at the Control Panel > Cloud > Templates menu. For more information, refer to the ISO section of this guide.

To create a virtual server from the ISO:

1. Go to your Control Panel > Cloud > Virtual Servers menu and click the “+” button, or click the Create Virtual Server button at the bottom of the screen. This will start a VS creation wizard.
2. Fill in the wizard step by step. Each of these steps is described in the corresponding sections below.
3. Click the Create Virtual Server button to start the creation process. You will be taken to the virtual server details screen.

It is required that you perform additional network configuration during ISO installation. For more information refer to Confirmation step below.

On this page:

- Step 1 of 4. Templates
- Step 2 of 4. Virtual Server Properties
- Step 3 of 4. Resources
  - Resources
- Step 4 of 4. Confirmation

See also:

ISOs
Manage ISO Virtual Servers
ISO Virtual Server Networks
ISO Virtual Server Disks
ISO Virtual Server Statistics
8.2.4.1 Step 1 of 4. Templates
At this step, choose a specific ISO template from which your virtual server will be built.
To choose a template:
1. Click the ISO template group.
2. Select the template.
3. Click Next.
Proceed to the following step of the wizard and specify the virtual server properties.

8.2.4.2 Step 2 of 4. Virtual Server Properties

At this step you need to indicate your virtual server's properties.
Specify the following virtual server properties:

- **Label** - the label of the virtual server. The required parameter.
- **Hostname** - the hostname of the virtual server. The required parameter. The hostname should consist of letters [A-Z a-z], digits [0-9] and dash [-]. For more info on hostname validation, refer to RFC standard documentation.

Particular characters are not allowed for Windows-based virtual servers:

- percent sign [%]
- double quotation marks ['"]
- brackets [<,>]
- vertical bar [\]
- caret [\^]
- ampersand [\&]
- parentheses [\(,\)]

- **Domain** - specify the domain for this VS. The default value is `localdomain`. This parameter is not applicable to Windows virtual servers.

For example:
`test.onapp.com` - specify 'test' as hostname, 'onapp.com' - as domain.
If you leave the domain field blank, the default value 'localdomain' will
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be used and you will get the following - test.onapp.com.localdomain.

- **Time zone** - set the time zone for the virtual server. This parameter is applicable only to Windows XEN and KVM virtual servers.

- **Password** - a secure password for the VS. It can consist of 6-99 characters, letters [A-Za-z], digits [0-9], dash [-] and lower dash [ _ ], and the following special characters: ~ ! @ # $ * _ + = ` \\ { } [ ] : ; ' , . ? /. You can use both lower- and uppercase letters. If you leave password field blank, it will be generated automatically.

- **Password confirmation** - repeat the password to confirm it.

- **Encrypt password** - move the Encrypt Password slider to the right, to encrypt your password, then enter an encryption key in the field that appears.

Click **Next** to proceed to the following step of the wizard to specify the virtual server resources.

8.2.4.3 Step 3 of 4. Resources

At this step, you can choose to create the virtual server either by selecting a predefined instance package or by setting your virtual server's resources, such as disk size, network configuration and other manually.

- A VS created using instance packages is called a instance package VS.

- A VS created by setting resources manually is called a custom virtual server.

Depending on the permissions, this step will display either **Instance packages** or **Create your own** tabs, or both of them.

You are forwarded to the next step from the tab you are currently on. If you select an instance package and then click on the **Create Your Own** tab and proceed to the next step, the system will set the resources from the **Create Your Own** tab even if you did not configure any resources there.

8.2.4.3.1 Resources

**Instance packages**

Note that instance package VSs can only be created on compute resources within compute zones where all compute resources are assigned the same amount of CPU units. If there are compute resources with different amount of CPU units set in a zone, it will not be possible to create instance package VSs in such zones. The reason is that CPU priority for instance package
VSs in this configuration cannot be set to 100%, which is the default value for such virtual servers.

If there are no available IP addresses during VS creation, all instance packages will be grayed out in the wizard.

From this tab, you can choose one of the predefined instance packages for your virtual server. If you select a compute zone that does not have enough resources during virtual server creation, you will see all instance packages available to you, but those that have resources incompatible with the chosen compute zone will be grayed out. Grayed out instance packages cannot be selected.

For each of the instance packages the following details are displayed:

- **Memory** - the RAM size (GB) available in the instance package
- **CPUs** - the number of CPU cores available in this instance package
- **Disk Size** - the disk size available in this instance package
- **Bandwidth** - the bandwidth available in this instance package
- **Price per Hour:**
  - **Mode ON** - hourly instance package price for the VS powered on
  - **Mode OFF** - hourly instance package price for the VS powered off
- **Price per Month:**
  - **Mode ON** - monthly instance package price for the VS powered on
  - **Mode OFF** - monthly instance package price for the VS powered on

Click the instance package to select it. After that, the instance package you have chosen will be highlighted in green.

Virtual servers created using instance packages do not support autoscaling.

Create Your Own

Using this tab you can define the resources for your virtual server manually:

**Compute Resources**

- **Compute Zone** - the Compute zone to build the VS on
- **Compute Resource** - the specific Compute resource to build the VS on. Compute resource may be selected automatically according to the set **provisioning type**.

**Resources**

- **RAM** - set the amount of virtual server's RAM. The maximum RAM depends on your bucket's settings. The maximum RAM that can be assigned to a VS is 168 GB regardless of the Max RAM value set in the bucket. The maximum RAM that can be assigned to a VS built on a XEN 32bit (x86) template is 16 GB.
- **CPU Cores** - set the amount of virtual server's CPU cores. For KVM Compute resources, this parameter sets CPU sockets by default, unless CPU topology is enabled.

- **CPU Priority (or CPU Units)** - set virtual server's CPU priority. If the CPU units are switched on in the bucket for this user, then CPU priority is replaced with CPU units. Refer to Billing Calculation section for details on CPU units and CPU priority.

The following options are available for VSs based on KVM Compute resources only, providing the Enable CPU topology permission is switched on for the user.

- **Use CPU Topology** - move the slider to the right, to set the following parameters:
  - **CPU Sockets** - set the amount of sockets.
  - **CPU Threads** - set the amount of threads per core.

CPU topology (CPU sockets and CPU threads) is the Labs feature preview. Pay attention that setting CPU sockets and CPU threads are at your own risk only!

You may face the following problems when setting CPU topology:

- Currently you cannot set CPU sockets and threads parameters for existing VSs.
- After setting, the new parameters won't be shown at the VS details screen.
- Some Linux VSs fail to boot up.

**Primary Disk**

- **Data Store Zone** - choose a data store zone for VS's primary disk.
- **Primary disk size** - set the primary disk size.

**Swap Disk**

- **Data Store Zone** - choose a data store zone for VS's swap disk.
- **Swap disk size** - set the swap disk size. There is no swap disk for Windows-based VSs. In all other cases, swap disk size must be greater than zero.
- **Disable** - select the checkbox to disable a swap disk.

**Network Configuration**

- **Network Zone** - choose a network zone from the drop-down box.
- **Network** - choose the network from which the VS should get the IP address.
- **Selected IP address** - tick this checkbox to view only own IP addresses in the IP addresses dropdown.
- **Show IP address selection for new VS** - if the option is available, you can also assign an IP address for the VS from the drop-down menu. Indicate Compute resource and network to have the list of available IPs.
- **Port Speed** - set the port speed for this VS

**Selected IP address** option is enabled via the "Show IP address selection for new VS" slider on the Admin > Settings > Configuration screen (under the System tab).
- You can't select unlimited port speed if the Network Zone is not selected. In this case the port speed will be 1 by default. It's possible to create virtual server with unlimited network speed without selecting a network zone only if you have only one Network Zone assigned to your bucket.

Click **Next** to proceed to the last step of the wizard.

**8.2.4.4 Step 4 of 4. Confirmation**

At this step, configure the automation settings. This is the final step of the virtual server creation wizard.

- Move the **Boot Virtual Server** slider to the right if you want the virtual server to be started up automatically.

After you set up these parameters, click the **Create Virtual Server** button to start the creation process.

At the Confirmation step you can find the configuration summary of VS, which will be created. You can view template's name, RAM size, number of networks, primary disk and swap disk size, number of cores.

When virtual server is created, you will be redirected to VS details page. Take the following steps to finish ISO installation process:

1. Go to VS **Networking > IP Addresses**.
2. Copy the following data: IP Address, netmask, gateway, resolver (DNS).
3. Go to console, where ISO installation process is running and enter copied IP Address, netmask, gateway and resolver (DNS).

**8.2.5 Manage ISO Virtual Servers**

OnApp Cloud gives you high-end cloud management features for virtual servers that are built from ISOs including:

<table>
<thead>
<tr>
<th>Virtual Server Options</th>
<th>Power Options Options</th>
<th>Administrative Options</th>
<th>Networks</th>
<th>Disks</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Edit</strong></td>
<td>Reboot / Reboot in recovery</td>
<td>Change owner</td>
<td>Configure network interface</td>
<td>Create disks</td>
<td>CPU utilization</td>
</tr>
<tr>
<td><strong>Migrate</strong></td>
<td>Suspend</td>
<td></td>
<td>Set firewall rules</td>
<td>Edit disks</td>
<td>Billing statistics</td>
</tr>
<tr>
<td><strong>Delete</strong></td>
<td>Shut down</td>
<td></td>
<td>Virtual server IP addresses</td>
<td>Migrate disks</td>
<td>Network interface statistics</td>
</tr>
</tbody>
</table>
This document provides the information on how you can manage the virtual servers built from ISO.

On this page:

- **Edit ISO Virtual Server**
- **Segregate ISO Virtual Server**
- **Clone ISO Virtual Server**
- **Migrate ISO Virtual Server**
- **Delete ISO Virtual Server**
- **ISO Virtual Server Power Options**
- **Change Owner of ISO Virtual Server**

See also:

- **ISOs**
- **ISO Virtual Server Networks**
- **ISO Virtual Server Disks**
- **ISO Virtual Server Statistics**

8.2.5.1 Edit ISO Virtual Server

You can edit resources for all VVs. Depending on the OS it is built on, some VVs can have their CPU and RAM resized without needing to be powered off ("resize without reboot"). If the VS template allows resize without reboot, the resize should be completed automatically: you will be returned to the VS details screen and see a message indicating the resize was successful. If the template does not allow this, you will be asked to confirm that the VS will need rebooting so that the resize can take place.

Windows virtual servers cannot be resized without reboot.
The Edit Virtual Server screen will differ depending on the way the VS resources were selected: either manually or using an instance package. To adjust VS resources:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the server you want to resize, to show its details screen.
3. Click the Tools button and select the Edit Virtual Server link.

For virtual servers built by selecting resources manually:

- Change CPU cores, CPU priority/units and RAM values.

For virtual servers built using instance packages:

- Choose the new instance package for your virtual server. Click the instance package to select it. After that, the instance package you have chosen will be highlighted in green.
  Those instance packages that have resources incompatible with the compute zone, on which the VS is built, will be greyed out. Greyed out instance packages cannot be selected.
  You can only choose from those instance packages that offer more disk size than the VS currently uses.
  After you select a new instance package you can use the extra disk size to create a new disk for the VS or make the existing VS disk larger.

You can also edit the Time Zone parameter for all Windows KVM and Xen virtual servers. After you edit the server's time zone, you need to stop and then start up the VS. Currently, the time zone is set at the Compute resource side only. Therefore, users need to set the target time zone inside a Windows VS manually. Setting correct time zone at the Compute resource side helps to keep correct time inside a VS after starting it if time synchronization is not completed for some reason.

4. Click the Save button.

8.2.5.2 Segregate ISO Virtual Server

If required, you can instruct OnApp to make sure a VS is never booted on the same Compute resource as another specific VS. This may be important if, for example, you have two name servers or a load balanced web server, and you need to keep VSs on separate physical servers.

To isolate one VS from another:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you want to segregate.
3. On the screen that appears, click the Tools button, then click Segregate Virtual Server.
4. In the dialogue box that pops up, use the drop-down menu to choose a VS you want to keep away from.
5. Click the Segregate Virtual server button to finish.
8.2.5.3 Clone ISO Virtual Server

You can create a clone based on the same resources as the origin ISO virtual server. To be able to clone virtual servers, you need to have the Clone own virtual servers permission enabled. The cloned virtual server inherits resources from the origin as follows.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Cloned Virtual Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Properties - owner, hostname, password, and label.</td>
<td>The same as the origin virtual server with Clone in the label, for example, Clone Origin Label.</td>
</tr>
<tr>
<td>Compute, data store, and network resources &amp; zones, Recipes, recipe variables, and service add-ons, Firewall rules</td>
<td>The same as the origin virtual server. If there are no available resources on the same data store, network, and compute resource, you cannot clone a virtual server.</td>
</tr>
<tr>
<td>IP address</td>
<td>The same as the origin virtual server. After a virtual server is cloned and before you start it, you should assign a new IP address.</td>
</tr>
<tr>
<td>Swap disk</td>
<td>A new swap disk is created on the cloned virtual server.</td>
</tr>
<tr>
<td>Backups</td>
<td>The backups of the origin virtual server are not cloned.</td>
</tr>
</tbody>
</table>

To clone a virtual server, follow the next procedure:

1. Go to your Control Panel > Cloud > Virtual Servers.
2. Click a label of the virtual server that you want to clone.
3. Click Tools and then click Clone Virtual Server.
4. In the pop-up box, click Clone Virtual Server to confirm the action.

After you confirm the action, several transactions are run to complete the cloning process. You can check a status of each transaction in Activity Log of the virtual server. After the virtual server is cloned, it is powered off until you start it.

8.2.5.4 Migrate ISO Virtual Server

Hot migration is available for VSs created from ISO if Allowed hot migrate slider was enabled during ISO upload or during ISO editing.

OnApp allows migration of ISO virtual servers between compute resources that share common data stores (or data store zones).

To migrate a virtual server:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you want to migrate.
3. Click the **Tools** button and press the **Migrate Virtual Server** link.
4. In the window that appears, choose the target compute resource from the drop-down menu.
5. Click the **Start Migration** button.

After migration, the power status of your virtual server remains the same as before the migration.
OnApp administrators can control user access over virtual server migration. Using OnApp permissions, you can allow/forbid users to perform migration of all virtual servers, or their own servers only. This is handled via the Control Panel's **Roles** menu.

### 8.2.5.5 Delete ISO Virtual Server

Shut down the virtual server before destroying it. If you are deleting a VS that is running, the VS will be deleted after the time set in Timeout Before Shutting Down VSs configuration parameter. To remove the virtual server from the cloud:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. On the screen that appears, you'll see the list of all virtual servers in the cloud. Click the label of the virtual server you want to delete.
3. On the virtual server's screen, click the **Tools** button, then select **Delete Virtual Server**.
4. Confirm by clicking the **Destroy** button.

**IMPORTANT:**
- You won't be able to restore a virtual server after deleting it.
- Deleting a virtual server removes all data stored on that virtual server.

### 8.2.5.6 ISO Virtual Server Power Options

To manage a virtual server power options:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the required virtual server.
3. Click the **Tools** button on the VS's screen to expand the **Tools** menu.
4. The **Tools** menu enables you to perform the following power actions on VSs (the exact list shown depends on the VS status):

- **Reboot Virtual Server** - powers off and then restarts the VS.
- **Reboot in Recovery** - powers off and then restarts the VS in the recovery mode.
- **Suspend** - stops a VS, changes its status to suspended and disables all the other actions on VS, unless unsuspended.
- **Shut Down Virtual Server** – pops up a dialogue box, where you can either Shut Down VS (terminates the VS gracefully), or Power Off VS (terminates the VS forcefully).
- **Startup Virtual Server** - queues a start-up action for a VS that's currently powered off.

  When you start up a VS, it might be implicitly cold migrated if the current compute resource does not have sufficient resources. For more information, refer to [Virtual Server Provisioning](#).

- **Startup on Recovery** - starts the VS in recovery mode.

- **Boot from ISO** - boots the VS from an ISO. You can boot virtual servers from your own ISOs or the ISOs that are uploaded and made publicly available by other users. If you boot a VS from an ISO with the RAM requirement larger than the VS's RAM, the transaction will fail. Make sure that you have enabled the **Any power action on own virtual servers and Allow own virtual servers to boot from ISO** permissions for the user to have access to this feature.

As soon as you boot a VS from the installation ISO, OnApp may lose control of any components (networks, disks etc.) !!! The only available actions will be start and stop a VS. Be aware, that all the contents of the disk may be also deleted.

### 8.2.5.7 Change Owner of ISO Virtual Server

To change owner of ISO virtual server:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the required virtual server.
3. Click the **Tools** button on the VS's screen to expand the VS Tools menu.
4. Click the **Change Owner** link.
5. Choose a user to whom you want to pass ownership of the VS from the drop-down list.
6. Click the **Change Owner** button.

If you want to change an owner of the VS, which was built using an instance package, ensure that the new owner has permission to create VS using instance package and appropriate instance package in the bucket. Otherwise you will not be able to change the ownership of this VS.

### 8.2.6 ISO Virtual Server Networks

The Networking menu in the Virtual Servers menu enables you to manage network interfaces, allocate IP addresses and set firewall rules for virtual servers.

#### 8.2.6.1 Configure ISO Virtual Server Network Interface

The **Networking** > **Network Interfaces** menu shows the virtual network interfaces allocated to this VS. Network interfaces join the physical network to the VS. When you create a VS a network interface is added automatically. This network interface will be
assigned to the existing physical network using a spare IP (IPv4) and will be set primary by default. OnApp supports IPv4 and IPv6. Since not every application supports IPv6, at least one IPv4 address must be allocated to a VS's primary network interface.

To see the list of all network interfaces allocated to the VS:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Networking tab, then click Network Interfaces.
4. On the page that follows you will see the following fields:

- **Interface** – optional label of the network interface.
- **Network join** – name of the network and a Compute resource or Compute zone this network is joined to.
- **Port speed** – the speed set to the interface.
- **Primary interface** – indication whether the interface is primary or not.

Here you can also view Interface Usage, Edit and Delete network interface (using icon controls) and Add a new network interface using the button at the bottom of the screen.

To add a network interface:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Networking tab, then click Network Interfaces.
4. Click the Add New Network Interface button at the bottom of the screen.
5. On the screen that appears, input values for the following parameters:
   - **Label** – a human-friendly name for the new interface.
   - **Physical Network** – choose a network join from the drop-down menu, which lists network joins assigned to the Compute resource/Compute zone on which the VS runs).
   - **Port speed** – set port speed in Mbps, or make it unlimited.
6. Click the Submit button.

To edit network interface label, port speed or set it as primary (if none is marked as primary), click Edit icon next to the appropriate network interface. After editing the port speed, the virtual server should be power cycled for the change to take effect.

To delete a network interface, click the Delete icon next to the interface you want to delete.

- To run the VS, at least one network interface with an assigned IP address (or addresses) is required!
- To allocate another physical network, add a new network interface.
- When managing Network Interfaces in OnApp, make sure to reflect all the changes in the ISO VS configuration manually.
• Configure ISO Virtual Server Network Interface
• Set ISO Virtual Server Firewall Rules
  o Add a specific firewall rule
  o Default firewall rules
• ISO Virtual Server IP Addresses
• ISO Virtual Server Network Speed

See also:
ISOs
Create ISO Virtual Server
Manage ISO Virtual Servers
ISO Virtual Server Disks
ISO Virtual Server Statistics

8.2.6.2 Set ISO Virtual Server Firewall Rules

With OnApp you can set firewall rules for the network interfaces of virtual servers. There are two types of firewall rule:
• ACCEPT – defines the packets that will be accepted by the firewall
• DROP – defines the packets that will be rejected by the firewall

Ensure that the following permissions are enabled before setting firewall rules for your virtual server:
• Create own firewall rules
• Destroy own firewall rules
• Read own firewall rules
• Update own firewall rules
• Update own virtual server
• Read own virtual server

You cannot apply firewall rules to virtual servers which are parts of a blueprint.

You can set the following:
• add a specific firewall rule - you can configure a firewall rule with specific parameters (source, destination port, protocol type etc.)
• set default firewall rules - you can set default firewall rules for an entire network interface

8.2.6.2.1 Add a specific firewall rule
To configure a firewall rule:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the VS for which you want to configure a firewall rule.
3. Click the Networking tab, then click Firewall.
4. On the page that appears, set the following:
   a. Choose the network interface.
   b. Specify if the rule defines requests that should be accepted or dropped.
   c. Set the IP address for which this rule is active.
      - Leave the empty field to apply this rule to all IPs
      - Enter hyphen-separated IPs to apply the rule to an IP range (e.g. 192.168.1.1-192.168.1.10)
      - Enter the IPs with slash to apply the rule to CIDR (e.g. 192.168.1.1/24)
   d. Set the port for which this rule is effective.
      - Leave the empty field to apply the rule to all ports
      - Enter colon-separated ports to apply the rule to a port range (e.g. 1024:1028)
      - Enter comma-separated ports to apply the rule to the list of ports (e.g. 80,443,21)
   e. Protocol type (for ICMP protocol only) - indicate a type of the ICMP protocol (range from 0 to 255)
   f. Choose the protocol (TCP, UDP, DCCP, SCTP or ICMP).

5. Save the rule by clicking the Add Rule button. The rule will be saved in the UI, but the transaction won’t be started until you click the Apply Firewall Rules button.

6. To start the transaction which runs firewall rules for a VS, click Apply firewall rules button.

7. Use Up and Down arrow buttons in the left column to change firewall rule position.

8. To edit or delete a firewall rule click the appropriate icon in the last column.

8.2.6.2.2 Default firewall rules
To set default firewall rules for a network interface:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the ISO VS for which you want to configure a firewall rule.
3. Click the Networking tab, then click Firewall.
4. On the page that appears, go to Default firewall rules section.
5. Choose ACCEPT or DROP command next to the network interface and click Save Default Firewall Rules. The rule will be saved in the UI, but the transaction won’t be started until you click the Apply Firewall Rules button.

Example:
The Int1 ACCEPT 122.158.111.21 22 TCP firewall rule means that the Int1 network interface will accept all requests and packets addressed from 122.158.111.21 using the TCP protocol on port 22.
The Int2 DROP 122.158.111.21 22 UDP firewall rule means that the Int2 network interface will reject all requests and packets from 122.158.111.21 using the UDP protocol on port 22.

If you reboot a Xen-based VS from the console, the firewall rules for this VS will be lost, and you will need to update the firewall rules again.

8.2.6.3 ISO Virtual Server IP Addresses
In the Networking > IP Addresses tab you can find the list of assigned IP addresses, allocate new IP addresses and rebuild a network.

To allocate a new IP Address to the VS:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Networking > IP Addresses.
4. Click the Allocate New IP Address button.
5. Select a network interface from the drop-down menu (only the network interfaces you added to the VS will be available). The IP Address will be allocated automatically.

6. (Not available for federated VSs) As an alternative you can manually select an IP address from the IP Pool associated with the network interface. To enable this option move the Specify IP Address slider to the right and choose IP Address from the drop-down list. You may select an IP address that's already assigned to a VS, but only one VS should be online at a time. Use Please show me used IP Pool, Show only my IPs and Show only IPv6 checkboxes to narrow the list of IP in the drop-down list.

7. Click the Add IP Address button.

After Allocating New IP address(es) for ISO virtual server, configure this IP Address manually for ISO in console.

To remove an IP address from a VS:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Networking > IP Addresses tab.
4. Click the Delete icon next to the IP address you want to delete.
5. In the pop up window that appears:
   - Choose Delete with Reboot option if you want to reboot a VS and rebuild the network immediately after deleting the IP address. After choosing the Delete with Reboot option you will be redirected to the VS's Overview page.
   - Choose Delete without Reboot option if you don't want to reboot a VS. In this case to apply the changes, you will have to the reboot the VS additionally.

You can't delete an IP address that is in use.

8.2.6.4 ISO Virtual Server Network Speed

The main Virtual Servers screen displays the network speed of each VS's primary network interface. To see the speed of all interfaces assigned to a VS:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you are interested in.
3. Click the Networking > Network Interfaces tab.
4. On the screen that appears, the Port Speed column shows the network speed of the network interface.

To edit a virtual server’s network speed:
1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you want to change.
3. Go to the **Network** > **Network Interfaces**.
4. In the last column click the **Edit** button.
5. Change the port speed.
6. Click the **Submit** button to save changes.

### 8.2.7 ISO Virtual Server Disks

Virtual server storage is provided by disks. A disk is a partition of a data store that is allocated to a specific virtual server. Disks can be assigned as standard or swap disks (there are no swap disks for Windows based templates). They can also be set as primary (that is, the disk from which an OS will boot).

Managing disks for the entire cloud is handled through the Control Panel's Settings menu. Disks for individual virtual servers are managed through the Control Panel > **Cloud** > **Virtual Servers** menu.

Creating multiple partitions on one disk is forbidden for all virtual servers.

---

#### 8.2.7.1 Add Disks to ISO Virtual Servers

**On this page:**

- Add Disks to ISO Virtual Servers
- Edit ISO Virtual Server Disks
- Migrate ISO Virtual Server Disks
- Delete ISO Virtual Server Disks

**See also:**

- **ISOS**
- **Create ISO Virtual Server**
- **Manage ISO Virtual Servers**
- **ISO Virtual Server Networks**
- **ISO Virtual Server Statistics**

Adding a disk to a virtual server will require that VS should be rebooted. If a VS is running when you try to add a new disk to it, you'll be asked to confirm the reboot. To add a disk to a virtual server:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click a VS's label to open its details screen.
3. Click the **Storage** > **Disks**.
4. Click the "+" button or the **Create Disk** button.
5. Fill in the details:
   - Specify disk label.
   - Choose the data store to create a disk on from the drop-down list.
   - Move the slider to the right to specify the desired disk size.

The disk size should not exceed 2 TB when a new disk is added. You can later resize the disk if you need it to be larger.
than 2 TB.

6. Click the Add Disk button to finish.

Restrictions:
- If you choose a Solidfire data store, the minimum disk size will be regulated by Solidfire Data Store Zone settings.
- If virtual server and the control panel server belong to different networks, the hot attach transaction will fail.
- When you add a new disk to a virtual server, it automatically becomes available to that server.

8.2.7.2 Edit ISO Virtual Server Disks

For primary and swap (Linux, FreeBSD) disks you may only change the label and the size. You can easily resize disks when needed. The resize will fail if your current usage is greater than the new size you request. Note, that any changes on disk size will lead to reboot of your VS.

To change disk size:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Make sure your virtual server is powered off, then click its label to open its details screen.
3. Click the Storage tab > Disks.
4. Click the Actions button next to the disk you want to change, then click the Edit link.
5. Enter a new disk label and size in GB in the fields provided.
6. Click the Save Disk button.

- You cannot decrease disk size. Only the increase disk size option is available.
- You cannot resize the primary disk for FreeBSD-based virtual servers.

8.2.7.3 Migrate ISO Virtual Server Disks

You can migrate disks of your virtual servers to other data stores, which are allocated to the same Compute resource. Unlike VS migration – disk migration requires reboot of the VS (despite the template it is based on).

To migrate a disk:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Make sure your virtual server is powered off, then click its label to open its details screen.
3. Click the Storage > Disks.
4. Click the **Actions** button next to the disk you want to move to another data store, then click the **Migrate** button.

5. On the screen that appears, select a target data store from a drop-down box.

6. Click **Start Migrate**.

- You can only migrate disks to data stores in data store zones assigned to your bucket.
- You cannot migrate a disk to a data store with less capacity than the disk size.
- If you move a 850GB disk between aggregates with 10GB actual usage, the 'dd' image of the local volume manager will take 850GB space, because the entire local volume manager is copied, including zero 'd space which may not be able to be recovered.

### 8.2.7.4 Delete ISO Virtual Server Disks

To delete a disk:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Make sure your virtual server is powered off, then click its label to open its details screen.
3. Click the **Storage > Disks** tab.
4. Click the **Actions** button next to the disk you want to delete, then click **Delete**.
5. In the pop-up window, move the **Force Reboot** slider to the right, then select the VS shutdown type.
6. Move the **Required Startup** slider to the right to start up the VS automatically.

**Steps 5 and 6 apply to disks of VSs that are on.**

7. Click the **Destroy Disk** button.

This will schedule the "destroy disk" transaction.

### 8.2.8 ISO Virtual Server Statistics


#### 8.2.8.1 ISO Virtual Server CPU Utilization

OnApp tracks CPU usage for virtual servers and generates charts that help analyze VS performance.
The charts show the total CPU usage for all the cores of this particular VS for a specified time period.

The vertical axis shows the CPU usage percentage (CPU percentage is the core-independent quantity). The horizontal axis defines a time period.

To see CPU usage statistics:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Overview > CPU Usage.
4. On the screen that appears, the top chart shows CPU usage for the last 24 hours. The bottom chart shows usage for the last three months (if there is enough data). If there is less data available, the chart will show utilization for the time available.
5. Move the Show in My Timezone slider to the right if you want to show bandwidth statistics according to your profile's timezone settings.
6. To zoom into a time period, click and drag in a chart. Click the Reset Zoom button to zoom out again.
7. You can filter the statistics by date and time - select the time period from the drop-down menu and click the Apply button.

To see what percentage of Compute resource CPU resource a VS takes, go to your Control Panel's Virtual Servers menu and click the label of the VS you're interested in. On the screen that appears, the CPU(s)/Shares parameter displays the amount of CPU resource given to this VS.

On this page:
- ISO Virtual Server CPU Utilization
- ISO Virtual Server Billing Statistics
- ISO Virtual Server Network Interface Statistics
- ISO Virtual Server Disk IOPS Statistics

See also:
- ISOs
- Create ISO Virtual Server
- Manage ISO Virtual Servers
- ISO Virtual Server Networks
- ISO Virtual Server Disks

8.2.8.2 ISO Virtual Server Billing Statistics

OnApp has a record of all the charges applied to your VSs for the last three month period. If a virtual server was created less than three months ago, statistics are recorded for the VS's existence to date. You can view all statistics available, or those for a shorter period by setting a Start and End time.

To view billing statistics for a virtual server:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the **Overview > Billing Statistics** tab.

4. You can filter the statistics by date and time - select the time period from the drop-down menu and click the **Apply** button. By default, the statistics are generated for the last three months or the actual VS existence period.

5. Move the **Show in my Timezone** slider to the right if you want to view billing statistics according to your profile's timezone settings. By default, billing statistics is shown in UTC.

6. On the page that appears:

   - **Date** – particular date and time for the generated statistics
   - **Users** – the virtual server owner. Click the owner name to see the User Profile (user details)
   - **Virtual Servers** – the virtual server name with the total due for VS resources (CPU priority, CPUs, memory and template resources) for the point of time specified in the Date column.
   - **Network Interfaces Usage** – the total due for the network interfaces used by this VS for the point of time specified in the Date column. Click the network interface name to see its details.
   - **Disks Usage** – the list of disks assigned to this VS with the total due for the disk space resources (disk size, data read/written, reads/writes completed) for the point of time specified in the Date column. Click the disk name to see its details.
   - **Costs** – the total due for the Virtual Servers, Network Interfaces and Disks resources at the point of time specified in the Date column.

Scroll down to see Total Amount (the total due for the whole billing statistics period).

8.2.8.3 ISO Virtual Server Network Interface Statistics

OnApp tracks network usage for virtual servers and generates charts that help analyze network performance. To see network utilization statistics for a virtual server:

1. Go to your Control Panel > **Cloud > Virtual Servers** menu.

2. Click the label of the virtual server you're interested in.

3. Click the **Networking > Network Interfaces** tab.

4. Click the **Statistics** (chart) icon next to the network you're interested in.

5. On the screen that appears, the top chart shows bandwidth usage for the last 24 hours. The bottom chart shows usage for the last three months.

6. To zoom into a time period, click and drag in a chart. Click the **Reset zoom** button to zoom out again.

7. You can filter the statistics by date and time - select the time period from the drop-down menu and click the **Apply** button.

8.2.8.4 ISO Virtual Server Disk IOPS Statistics
The system tracks IOPS (Input/Output Operations per Second) for virtual servers and generates charts that help analyze VS disk performance. The data presented in the chart are for the periods during which the statistics was gathered, typically 3 minutes. To see IOPS for a virtual server:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Storage > Disks tab.
4. Click the Actions button next to the required disk, and then choose IOPS.
5. There are four charts on the screen that appears:
   - IOPS for the last hour
   - IOPS for the last 24 hours
   - Data written/read (in Kb) for the last 24 hours
   - Data written/read (in Kb) for the last hour
6. To zoom into a time period, click and drag in a chart. Click the Reset Zoom button to zoom out again.
7. You can filter the statistics by date and time - select the time period from the drop-down menu and click the Apply button.

The OnApp API allows you to limit the Hourly IOPS and Hourly data by setting the limit=N parameter, where the N variable is the number of hours for which the charts will display the info.

8.2.9 ISO Virtual Server Backups

OnApp supports normal backups for ISO Virtual Servers. Normal backups contain all the information stored on a server's disk. If you have switched on incremental backups for the cloud, normal backups will still be made for ISO virtual servers. For detailed information on backups refer to Virtual Server Backups.

Backups in the OnApp Control Panel are associated with a particular user instead of being associated with a virtual server. To view the list of user backups, refer to View User Backups section.

8.2.9.1 View ISO Virtual Server Backups

To view the list of ISO virtual server's backups:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the required ISO virtual server.
3. Click the **Backups** tab, then select **Images**. Images are full backups of ISO virtual server disks.

4. On the screen that appears, you'll see a list of ISO virtual server backups.

5. Click the label of the required ISO virtual server backup to see the following tools - restore backup, delete backup and add/edit note.

**On this page:**
- View ISO Virtual Server Backups
- Take ISO Virtual Server Disk Backups
- Restore ISO Virtual Server Backup
- Delete ISO Virtual Server Backup
- Add ISO Virtual Server Backup Note

**See also:**
- Virtual Servers
- Smart Servers
- Container Servers
- Compute Resources

---

### 8.2.9.2 Take ISO Virtual Server Disk Backups
To back up an ISO virtual server disk:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the server you want to back up.
3. Click the **Storage tab** and select **Disks**. You'll see a list of the disks allocated to that ISO virtual server.
4. Click the **Actions** icon next to a disk you want to take a backup of, then click **Backup**. You'll see a list of all the backups taken and pending for that disk, along with the tools to restore backups and delete them.
   - To make a backup, click the **Take a Backup** button at the end of the list. If required, you can add a note to a new backup. You can also select **Force Windows Backup**.

   *This option for Windows virtual servers is designed as a last resort, when the backup cannot be taken due to NTFS file system problems. Switching on this option will bring up a dialog box with the following message: "If you enable this option there is no guarantee that backup will be consistent."

   Select "Yes" to proceed.*

### 8.2.9.3 Restore ISO Virtual Server Backup
To restore a backup:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the required ISO virtual server.
3. Click the **Backups** tab, then select **Images**.

4. On the screen that appears, click the **Actions** icon next to the backup you want to revert to and choose **Restore**.

8.2.9.4 Delete ISO Virtual Server Backup

To delete a backup:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the required ISO virtual server.
3. Click the **Backups** tab, then select **Images**.
4. On the screen that appears, click the **Actions** icon next to the backup you want to remove and choose **Delete**.

8.2.9.5 Add ISO Virtual Server Backup Note

To add/edit virtual server backup's note:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the required ISO virtual server.
3. Click the **Backups** tab, then select **Images**.
4. On the screen that appears, click the **Actions** icon next to the required backup and choose **Add Note**. Make necessary changes and click **Submit**.

8.2.10 ISO Virtual Server Backup Schedules

You can schedule backups of virtual servers (VS disks) as required. For example, you can set up a schedule to back up your disks once a week. Scheduled VS backups enable specific backups to be scheduled for individual VSs. OnApp supports only normal backups for ISO virtual servers, which include all the data from the server's disk.

8.2.10.1 View ISO Virtual Server Backup Schedules

To view the list of backup schedules for an ISO virtual server:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the ISO virtual server you’re interested in.
3. Click the **Storage** tab, then select **Disks**.
4. On the screen that appears, click the **Actions** button next to the disk you want to back up, then select **Schedule for Backups**.
5. On the screen that appears, you will see the list of backup schedules along with their details:
   - **Date** - time when the schedule was created
   - **Target** - the disk for which the schedule was created
   - **Action** - scheduled action
   - **Frequency** - how frequently the backup will take place according to the period set. For example, frequency of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years
   - **Rotation period** - number of backups after which the first backup will be deleted

Despite of the input value, for normal backups (when Disk is the
target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

- Next Start - the date and the hour of the next backup
- User - user who created the backup schedule
- Status - schedule status
- Actions - click the Actions icon to edit or delete the backup schedule

On this page:
- View ISO Virtual Server Backup Schedules
- Create ISO Virtual Server Backup Schedule
- Edit ISO Virtual server Backup
- Delete ISO Virtual Server Backup

See also:
- Virtual Servers
- Smart Servers
- Container Servers
- Compute Resources

8.2.10.2 Create ISO Virtual Server Backup Schedule
To add a backup schedule:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the ISO virtual server you want to schedule a backup for.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.
5. On the screen that follows, click the New Schedule button.
6. Specify schedule details:
   - Frequency - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - Period - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - Rotation period - number of backups after which the first backup will be deleted.

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.
- **Start time** - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).

7. Click the **Save** button to finish.

---

8.2.10.3 Edit ISO Virtual Server Backup Schedule

To edit a backup schedule:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the ISO virtual server you want to schedule a backup for.
3. Click the **Storage** tab, then select **Disks**.
4. On the screen that appears, click the **Actions** button next to the disk you want to back up, then select **Schedule for Backups**.
5. Click the **Edit** icon next to a schedule to change its details.
6. Specify schedule details:
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - **Rotation period** - number of backups after which the first backup will be deleted.

   Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

   - **Start time** - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).

   - **Enabled** - move the slider to enable or disable the schedule

   For a schedule with the **Failed** status, you can move the **Enabled** slider to the right to run the shedule once again.

7. Click the **Save** button to finish.
8.2.10.4 Delete ISO Virtual Server Backup

to delete a backup schedule:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the ISO virtual server you're interested in.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk with a backup schedule, then select Schedule for Backups.
5. Click the Actions icon next to the schedule you want to remove, then choose Delete.

8.3 Container Servers

Container Server is a regular VS based on default CoreOS template. This type of server allows the user to customize the server to implement integration with Docker or other container services.

If a new version of the CoreOS template is available, you can update the template in your cloud at Control Panel > Cloud > Templates > Template List > System Templates > Upgrades.

Container Server gives you high-end cloud management features including:

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The following options are not available for container servers:

- Convert backup to template
- Auto-scaling
- Setting SSH keys

### 8.3.1 View Container Servers

To view all container servers deployed in the cloud:

1. Go to your Control Panel > **Cloud** > **Container Servers** menu to see an overview of all container servers in the cloud.

2. The page that loads will show the list of container servers together with their:
   - operating system
   - label. Click the label to see the container server details.
   - VIP status (enabled or disabled). Click the icon to enable/disable VIP status of a particular container server.
   - IP addresses
   - allocated disk size
   - RAM
   - user - the owner of this container server. Click the user name to see the owner details.
   - power status. Click the on/off buttons to change the status.

3. Click the **Actions** button next to the container server for the quick access to the list of container server actions (the list of actions displayed depends on the container server status):

   1. Reboot
   2. Recovery reboot
   3. Shutdown
   4. Startup
To search for a particular container server, click the Search icon at the top of the container server list. When the search box appears, type the text you want to search for and click the Search button.

### 8.3.2 View Container Server Details

To view details of a specific container server:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the container server you're interested in.
3. The screen that appears loads the container server properties, notes, activity log and tools for managing your container server.

#### 8.3.2.1 Container Server Properties

Container server properties page gives general overview of the container server details:

- VIP status (on/off). Click the icon to change the status.
- Template the container server is built on
- Power status & On/Off/Reboot buttons.

Clicking the OFF button performs graceful shutdown and then powers off the container server after the timeout set in Configuration settings.

- Segregated Container Server. This field appears if the container server is segregated from another container server. Click the label of the container server to view the details of the container server from which the current server is segregated.
- FQDN (fully qualified domain name)
- Compute resource. Click the Compute resource name to see its details
- Login credentials. To log in, use the following credentials:
  - user - 'core'
  - password - password from the container server details’ page
- Owner. Click the owner name to see its details.
- IP Addresses. Only the first five IP addresses are displayed on the container server properties page. To view the list of all container server IP addresses, mouse over IP addresses area or go to the Networking tab > IP addresses tab.
• **Auto-backups** - move the slider to enable or disable auto-backups for this server. For more information refer to Container Server Backup Schedules.

• Estimated Price per hour. This sum does not take into consideration the free limits for resources set in the bucket. Therefore, the final price for the server might differ from the sum indicated here.

Please pay attention that when you edit a Container Server, the price is changed, and the new price is not applied immediately. It takes about 5 minutes to take effect.

• CPU(s)
• CPU priority or CPU units
• Disk Size
• Memory
• CPU Usage (%)
• Data Sent
• Data Received

### 8.3.2.2 Notes
The Notes section lists brief comments or reminders for a container server. You can add either Admin's or User's notes. The Admin's note will be available to cloud administrators. Click the Actions icon in the Notes section of the page to add admin's or user's note.

### 8.3.2.3 Container Server Management
- Click the **Tools** button to expand the Tools menu with the container server management options.
- Use the top menu to manage your container servers' statistics/networking/storage options.

### 8.3.3 Create Container Server
Container server creation process is similar to virtual server creation. The difference is that a specific default template is used automatically during container server creation. You also need to set the cloud-config for your container server. To create a container server:

1. Go to your Control Panel > Cloud > Container Servers menu and click the "+" button, or click the Create Container Server button at the bottom of the screen. This will start a container server creation wizard.

2. Fill in the wizard step by step. Each of these steps is described in the corresponding sections below.

3. Click the Create Container Server button to start the creation process. You will be taken to the container server details screen.

### 8.3.3.1 Step 1 of 6. Cloud Locations

On this page:

- Step 1 of 6. Cloud Locations
- Step 2 of 6. Properties
- Step 3 of 6. Resources
- Step 4 of 6. Recipes
- Step 5 of 6. Cloud-Config
- Step 6 of 6. Confirmation
If you face the problem with viewing the maps, refer to the Add Google Map API Key section of this guide.

The Cloud Locations step applies to those users who have Compute zones assigned to location groups in their bucket. This step will be present in the wizard if both of the following requirements are met:

- all compute resources available to the user are assigned to location groups
- compute resources are assigned to different locations

If the user's bucket has several Compute zones, some of which are assigned to location groups, whereas others are not - the cloud locations screen will not be available in the wizard. Also if all compute zones are assigned to the same location this step will be skipped. In this case the wizard will start with the Properties step.

Indicate your container server's cloud location:

- **Country** - choose the country, where the cloud is located, from the drop-down menu.
- **City** - specify the city, where the cloud is located, from the drop-down menu.

Click **Next** to proceed to the following step of the wizard to specify the container server properties.

8.3.3.2 Step 2 of 6. Properties

At this step you need to indicate your container server's properties, such as label, password and other. You can create a container server having specified only the required parameters and configure it later.

Specify the following container server properties:

- **Label** - the label of the container server. The required parameter.
- **Hostname** - the hostname of the container server. The required parameter. The hostname should consist of letters [A-Z a-z], digits [0-9] and dash [-]. For more info on hostname validation, refer to RFC standard documentation.
- **Domain** - specify the domain for this VS. The default value is *localdomain*. This parameter is not applicable to Windows virtual servers.

For example:

*test.onapp.com* - specify 'test' as hostname, *onapp.com* - as domain. If you leave the domain field blank, the default value '*localdomain*' will be used and you will get the following - *test.onapp.com.localdomain*.

- **Password** - a secure password for the VS. It can consist of 6-99 characters, letters [A-Z a-z], digits [0-9], dash [-] and lower dash [ _ ], and the following special characters: ~ ! @ # $ * - + = ` \ [ ] : ; ' , . ? / . You can use both lower- and uppercase letters. If you leave password field blank, it will be generated automatically.
- **Password confirmation** - repeat the password to confirm it.
- **Encrypt password** - move the Encrypt Password slider to the right, to encrypt your password, then enter an encryption key in the field that appears.
Click **Next** to proceed to the following step of the wizard to specify the container server resources.

### 8.3.3.3 Step 3 of 6. Resources

#### Compute Resources
- **Compute Zone** - the Compute zone to build the container server on.
- **Compute Resource** - the specific Compute resource to build the container server on. Compute resource may be selected automatically according to the set provisioning type.

#### Resources
- **RAM** - set the amount of container server's RAM. The maximum RAM depends on your bucket's settings. The maximum RAM that can be assigned to a container server is 168 GB regardless of the Max RAM value set in the bucket. The maximum RAM that can be assigned to a container server built on a XEN 32bit (x86) template is 16 GB.
- **CPU Cores** - set the amount of container server's CPU cores. For KVM compute resources, this parameter sets CPU sockets by default, unless CPU topology is enabled.
- **CPU Priority (or CPU Units)** - set container server's CPU priority. If the CPU units are switched on in the bucket for this user, then CPU priority is replaced with CPU units.

The following options are available for container servers based on KVM Compute resources only, providing the **Enable CPU topology** permission is switched on for the user.
- **Use CPU Topology** - move the slider to the right, to set the following parameters:
  - **CPU Sockets** - set the amount of sockets.
  - **CPU Threads** - set the amount of threads per core.

CPU topology (CPU sockets and CPU threads) is the Labs feature preview. Pay attention that setting CPU sockets and CPU threads are at your own risk only!

You may face the following problems when setting CPU topology:
- Currently you cannot set CPU sockets and threads parameters for existing container servers.
- After setting, the new parameters won't be shown at the container server details screen.
- Some container servers fail to boot up.

#### Primary Disk
- **Data Store Zone** - choose a data store zone for container server's primary disk.
- **Primary disk size** - set the primary disk size.

#### Swap Disk
- **Data Store Zone** - choose a data store zone for container server's swap disk.
- **Swap disk size** - set the swap disk size. Swap disk size must be greater than zero.
- **Disable** - select the checkbox to disable a swap disk.
Network Configuration

- **Network Zone** - choose a network zone from the drop-down box.
- **Network** - choose the network from which the container server should get the IP address.
- **Selected IP address** - select the IP address for the container server from the drop-down list.
- **Show only my IP address** - tick this checkbox to view only own IP addresses in the IP addresses dropbox.
- **Port Speed** - set the port speed for this VS

Since not every application supports IPv6, at least one IPv4 address must be allocated to a VS's primary network interface.

You can't select unlimited port speed if the Network Zone is not selected. In this case the port speed will be 1 by default. It's possible to create a container server with unlimited network speed without selecting a network zone only if you have only one Network Zone assigned to your bucket.

Click **Next** to proceed to the following step of the wizard where you can specify the container server recipes.

8.3.3.4 Step 4 of 6. Recipes

At this step you need to indicate the recipes you want to assign to your container server. This step is optional. You can create a container server without choosing recipes and add them later if required.

1. Choose a recipe you want to assign to this container server by dragging the required recipe to the **Assigned recipes** pane.
2. To add a custom variable, click the "+" button next to the **Custom recipe variables** title bar, then specify variable details:
   - Specify the recipe name and its value.
   - Move the **Enabled** slider to the right to allow use of this variable.
3. Click **Next** to proceed to the next step of the wizard where you will set the cloud-config file.

The recipes step can be missing in the wizard if there are no recipes created in the cloud.

8.3.3.5 Step 5 of 6. Cloud-Config

The cloud-config enables you to customize different OS elements, such as network configuration, user accounts, etc. This file uses the YAML format and is processed after each reboot. Adding a cloud-config at this step is optional, you can later add or edit the cloud-config via OnApp API or UI. However, you should not change the cloud-config file inside the container server as changes will be lost after the server is rebooted. For the full list of items that can be configured in the cloud-config file, refer to [CoreOS documentation](https://github.com/coreos/config-generator).

To set the cloud-config for your container server:

- You can fill in the cloud-config in the **Cloud-Config** field.
- You can insert a cloud-config file from your local computer at the File tab by clicking the Choose File button. After the file is uploaded, cloud-config will appear in the Cloud-Config field.

- You can add an URL to your cloud-Config file in the File url field at the File url tab

8.3.3.6 Step 6 of 6. Confirmation
At this step, configure the automation settings. This is the final step of the container server creation wizard.

- Move the Build Container Server slider to the right if you want the system to automatically build the container server. If you leave this box blank, you will have to build your server manually after it is created.

- Move the Boot Container Server slider to the right if you want the container server to be started up automatically.

At the Confirmation step you can find the configuration summary of the container server, which will be created. You can view RAM size, primary disk and swap disk size, number of cores.

After you set up all parameters, click the Create Container Server button to start the creation process.

8.3.4 Edit Container Server
You can edit label, CPU and RAM resources for container servers. To edit the a container server:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the server you want to edit, to show its details screen.
3. Click the Tools button and select the Edit Container Server link.
4. Change label, CPU cores, CPU priority/units and RAM values, and click the Save button.

8.3.5 Container Server Cloud Config
The cloud-config enables you to customize different OS elements, such as network configuration, user accounts, etc. This file uses the YAML format and is processed after each
reboot. Adding a cloud-config when creating a container server is optional, you can later edit or add the cloud-config via OnApp API or UI.

- You should not change the cloud-config file inside the container server as such changes will be lost after the server is rebooted.
- For the full list of items that can be configured in the cloud-config file, refer to CoreOS documentation.

To add/edit the cloud-config for your container server:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the server you want to edit, to show its details screen.
3. Click the Configuration tab, then click Cloud Config.
4. On the page that loads you can add-edit the cloud-config for the container server:
   - You can fill in the cloud-config in the Cloud-Config field
   - You can insert a cloud-config file from your local computer at the File tab by clicking the Choose File button. After the file is uploaded, cloud-config will appear in the Cloud-Config field.
   - You can add a URL to your cloud-config file in the File url field at the File URL tab
5. Click Submit to save changes.
6. After you edit the cloud config, you need to reboot the container server at Control Panel > Cloud > Container Servers > Label > Tools > Reboot Container Server. Changes to the cloud config will not take effect if the server is not rebooted. The reboot should be done via OnApp Control Panel. If the reboot command is issued inside the container server, the changes to the cloud config will not take effect.

Cloud config example:

```
#cloud-config
write-files:
  - path: /etc/hosts
    permissions: '0644'
    content: |
      master1_IP master1 coreos00
      master2_IP master2 coreos01

coreos:
  etcd2:
    name: master1
    initial-cluster:
      master1=http://master1_IP:2380,master2=http://master2_IP:2380
      initial-advertise-peer-urls: http://$public_ipv4:2380
      advertise-client-urls:
      listen-client-urls: http://0.0.0.0:2379,http://0.0.0.0:4001
  fleet:
    public-ip: $public_ipv4
    metadata: "role=master"
  flannel:
    interface: $public_ipv4
```

```
8.3.6 Rebuild/Build Container Server Manually

If you haven't checked the Build Container Server option during the container server creation process, you will have to do this manually after the container server has been created. Building a container server is the process of allocating physical resources to that container server.

To build a container server manually or rebuild the application server on the same (or another) template:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the container server you're interested in.
3. On the screen that appears, click the Tools button and then click Rebuild Container Server.
4. On the screen that pops up, enter the encryption passphrase.
5. Move the Start CS after rebuild slider to the right if you want to have your container server started automatically after it is built.
6. Click the Rebuild Container Server button to finish.

After you rebuild your container server all data will be lost.

8.3.7 Migrate Container Server

You can migrate container servers using a hot or cold migration method:

- **Hot migration** is the migration of container servers with or without disks between compute resources that share common data stores or data store zones.
- **Cold migration** is the migration of container servers with disks between compute resources with local storage or across compute zones.

8.3.7.1 Hot Migration

You can migrate an online container server from one compute resource to another compute resource that are both utilizing local/shared/IS storage or across zones. There are two types of hot migration:

- **Compute Resource** - migration of a container server from one compute resource to another
- **Compute Resource and Storage** - migration of a container server with disk from one compute resource and data store to another

**Compute Resource**

To hot migrate a container server:

1. Go to your Control Panel > Cloud > Container Servers.
2. Click a label of a container server that you want to migrate.
3. Click the Tools button and click the Migrate Container Server button.
4. In the Migration Type box, select Compute Resource and click Next.
5. Select a *Target compute resource* from the box and click **Next**.

6. At the final step of the wizard, you can see the migration summary and select the following check boxes:
   - *Cold-migrate when hot-migration fails* - select the check box to apply cold migration in case of the hot migration failure
   - *Are you sure you want to migrate?* - select the check box to confirm the hot migration

7. When you are finished, click the **Submit** button.

**Compute Resource and Storage**

To hot migrate a container server:

1. Go to your Control Panel > **Cloud** > **Container Servers** menu.
2. Click the label of a container server you want to migrate.
3. Click the **Tools** button and click the **Migrate Container Server** button.
4. In the **Migration Type** box, select **Compute Resource and Storage (Hot)** and click **Next**.
5. Select the following destination resources:
   - *Target compute zone* - select a destination compute zone. The list includes compute zones that you have access to within the same network (i.e. KVM to KVM but not KVM to Xen).
   - *Target compute resource* - select a destination compute resource
   - *Target data store for disk* - select a destination data store for each disk. The list includes available data stores associated with the compute zone and compute resource that you selected earlier.

6. At the final step of the wizard, you can see the migration summary and select the following check boxes:
   - *Cold-migrate when hot-migration fails* - select the check box to apply cold migration in case of the hot migration failure
   - *Are you sure you want to migrate?* - select the check box to confirm the hot migration

7. When you are finished, click the **Submit** button.

After migration, the power status of your container server remains the same as before the migration. If you migrate a container server that's running, the whole process is almost unnoticeable.

8.3.7.2 **Cold Migration**

Cold migration enables you to migrate container servers with disks between compute resources with local storage or across compute zones. To cold migrate a container server:

1. Go to your Control Panel > **Cloud** > **Container Servers** menu.
2. Click the label of a container server you want to migrate.
3. Click the **Tools** button and click the **Migrate Container Server** link.
4. In the **Migration Type** box, select **Compute Resource and Storage (Cold)** and click **Next**.
5. Select the following destination resources:
   - *Target compute zone* - select a destination compute zone. The list includes compute zones that you have access to within the same network (i.e. KVM to KVM but not KVM to Xen).
   - *Target compute resource* - select a destination compute resource
Target data store for disk - select a destination data store for each disk. The list includes available data stores associated with the compute zone and compute resource that you selected earlier.

6. At the final step of the wizard, you can see the migration summary and select the Are you sure you want to migrate? check box to confirm the migration.

7. When you are finished, click the Submit button.

If you change the compute resource or data store zone, the billing will be changed according to the prices set for that new zone in the bucket. The new estimated price per hour for a VS is displayed at the bottom of the VS migration screen.

After migration, the power status of your container server remains the same as before the migration. If you migrate a container server that's running, the whole process is almost unnoticeable.

8.3.8 Segregate Container Server

If required, you can instruct OnApp to make sure a container server is never booted on the same compute resource as another specific container server. You can also remove segregation if required.

- Container servers can only be segregated from other container servers built by its owner.
- Container servers can only be segregated from container servers within the same compute zone.
- Container servers cannot be segregated from container servers running on the same compute resource.
- The segregated container server is not automatically migrated to another compute resource.

To isolate one container server from another:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the container server you want to segregate.
3. On the screen that appears, click the Tools button, then click Segregate Container Server.
4. In the dialogue box that pops up, use the drop-down menu to choose a server you want to keep away from.
5. Click the Segregate Container Server button to finish.

To remove segregation:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the container server you want to segregate.
3. On the screen that appears, click the Tools button, then click Desegregate Container Server.
4. In the dialogue box that pops up, click the OK button to finish.
8.3.9 Delete Container Server

Shut down the container server before destroying it. If you are deleting a container server that is running, the server will be deleted after the time set in Timeout Before Shutting Down VSs configuration parameter.

To remove the container server from the cloud:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. On the screen that appears, you’ll see the list of all container servers in the cloud. Click the label of the server you want to delete.
3. On the container server’s screen, click the Tools button, then select Delete Container Server.

**IMPORTANT:**
- You won’t be able to restore a container server after deleting it.
- Deleting a container server removes all data stored on that container server.

8.3.10 Container Server Power Options

To manage container server power options:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the required server.
3. Click the Tools button on the container server’s screen to expand the Tools menu.
4. The Tools menu enables you to perform the following power actions on container servers (the exact list shown depends on the container server status):

   - **Reboot Container Server** - powers off and then restarts the container server.
   - **Reboot in Recovery** - powers off and then restarts the container server in the recovery mode.
     For container servers with enabled encryption the temporary login is “root” and password is “recovery”.
     For container servers with password encryption disabled, the server root password will be used to reboot in recovery.
   - **Suspend** - stops a container server, changes its status to suspended and disables all the other actions on container server, unless unsuspended.
   - **Shut Down Application Server** – pops up a dialogue box, where you can either Shut Down container server (terminates the container server gracefully), or Power Off container server (terminates the container server forcefully).
   - **Startup Container Server** - queues a start-up action for a container server that’s currently powered off.
   - **Startup on Recovery** - starts the container server in recovery mode with a temporary login (“root”) and password (“recovery”).
   - **Boot from ISO** - boots the container server from an ISO. You can boot container servers from your own ISOs or the ISOs that are uploaded and made publicly available by other users. If you boot a server from an ISO with the RAM
requirement larger than the container server's RAM, the transaction will fail. Make sure that you have enabled the Any power action on own container servers permission for the user to have access to this feature.

As soon as you boot a container server from the installation ISO, OnApp may lose control of any components (networks, disks) !!! The only available actions will be start and stop a container server. Be aware, that all the contents of the disk may be also deleted.

8.3.11 Container Server Networks

The Networking menu in the Container Servers menu enables you to manage network interfaces, allocate IP addresses and set firewall rules for virtual servers.

8.3.11.1 Configure Container Server Network Interface

The Networking > Network Interfaces menu shows the virtual network interfaces allocated to this container server. Network interfaces join the physical network to the container server. When you create a container server a network interface is added automatically. This network interface will be assigned to the existing physical network using a spare IP (IPv4) and will be set primary by default.

OnApp supports IPv4 and IPv6. Since not every application supports IPv6, at least one IPv4 address must be allocated to a container server's primary network interface.

To see the list of all network interfaces allocated to the container server:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the server you're interested in.
3. Click the Networking tab, then click Network Interfaces.
4. On the page that follows you will see the following fields:

- **Interface** – optional label of the network interface.
- **Network join** – name of the network and a Compute resource or Compute zone this network is joined to.
- **Port speed** – the speed set to the interface.
- **Primary interface** – indication whether the interface is primary or not.

Here you can also view Interface Usage, Edit and Delete network interface (using icon controls) and Add a new network interface using the button at the bottom of the screen.

To add a network interface:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the server you're interested in.
3. Click the Networking tab, then click Network Interfaces.
4. Click the Add New Network Interface button at the bottom of the screen.
5. On the screen that appears, input values for the following parameters:
   - **Label** – a human-friendly name for the new interface.
   - **Physical Network** – choose a network join from the drop-down menu, which lists network joins assigned to the Compute resource/Compute zone on which the container server runs).
   - **Port speed** – set port speed in Mbps, or make it unlimited.
6. Click the **Submit** button.

To edit network interface label, port speed or set it as primary (if none is marked as primary), click **Edit** icon next to the appropriate network interface. After editing the port speed, the container server should be power cycled for the change to take effect.

To delete a network interface, click the **Delete** icon next to the interface you want to delete.

- To run the container server, at least one network interface with an assigned IP address (or addresses) is required!
- To allocate another physical network, add a new network interface.

---

### 8.3.11.2 Rebuild Container Server Network

To rebuild a network join, added to the container server (required after allocating new IP addresses):

1. Go to your Control Panel > **Cloud** > **Container Servers** menu.
2. Click the label of a required server.
3. On the screen that appears, click the **Tools** button, then click **Rebuild Network**.
4. In the pop-up window, move the **Force Reboot** slider to the right, then select the container server shutdown type.

   During rebuild network, the system tries to reach container server's network interface without rebooting server. Then, if it is not possible, transaction will quit. Force reboot action allows to rebuild container server network with reboot action if live rebuild is impossible. In case the force reboot option is disabled and system can not enter the container server, the network rebuild operation will fail.

5. Move the **Required Startup** slider to the right to start up a container server when you're rebuilding network of a powered off server.
6. Click the **Rebuild Network** button.

---

### 8.3.11.3 Set Container Server Firewall Rules

With OnApp you can set firewall rules for the network interfaces of container servers. There are two types of firewall rule:

- **ACCEPT** – defines the packets that will be accepted by the firewall
- **DROP** – defines the packets that will be rejected by the firewall

Ensure that the following permissions are enabled before setting firewall rules for your container server:

- Create own firewall rules
- Destroy own firewall rules
- Read own firewall rules
- Update own firewall rules
- Update own container server
- Read own container server

You cannot apply firewall rules to container servers which are parts of a blueprint.

You can set the following:

- **add a specific firewall rule** - you can configure a firewall rule with specific parameters (source, destination port, protocol type etc.)
- **set default firewall rules** - you can set default firewall rules for an entire network interface

### 8.3.11.3.1 Add a specific firewall rule

To configure a firewall rule:

1. Go to your Control Panel > **Cloud** > **Container Servers** menu.
2. Click the label of the servers for which you want to configure a firewall rule.
3. Click the **Networking** tab, then click **Firewall**.
4. On the page that appears, set the following:
   
   a. Choose the network interface.
   
   b. Specify if the rule defines requests that should be accepted or dropped.
   
   c. Set the IP address for which this rule is active.
      - Leave the empty field to apply this rule to all IPs
      - Enter hyphen-separated IPs to apply the rule to an IP range (e.g. 192.168.1.1-192.168.1.10)
      - Enter the IPs with slash to apply the rule to CIDR (e.g. 192.168.1.1/24)
   
   d. Set the port for which this rule is effective.
      - Leave the empty field to apply the rule to all ports
      - Enter colon-separated ports to apply the rule to a port range (e.g. 1024:1028)
      - Enter comma-separated ports to apply the rule to the list of ports (e.g. 80,443,21)
   
   e. Protocol type (for ICMP protocol only) - indicate a type of the ICMP protocol (range from 0 to 255)
   
   f. Choose the protocol (TCP, UDP, DCCP, SCTP or ICMP).

5. Save the rule by clicking the **Add Rule** button. The rule will be saved in the UI, but the transaction won't be started until you click the **Apply Firewall Rules** button.

6. To start the transaction which runs firewall rules for a container server, click **Apply firewall rules** button.

7. Use **Up** and **Down** arrow buttons in the left column to change firewall rule position.

8. To edit or delete a firewall rule click the appropriate icon in the last column.

### 8.3.11.3.2

**8.3.11.3.3 Default firewall rules**

To set default firewall rules for a network interface:
1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the container server for which you want to configure a firewall rule.
3. Click the Networking tab, then click Firewall.
4. On the page that appears, go to Default firewall rules section.
5. Choose ACCEPT or DROP command next to the network interface and click Save Default Firewall Rules. The rule will be saved in the UI, but the transaction won't be started until you click the Apply Firewall Rules button.

Example:
The Int1 ACCEPT 122.158.111.21 22 TCP firewall rule means that the Int1 network interface will accept all requests and packets addressed from 122.158.111.21 using the TCP protocol on port 22.
The Int2 DROP 122.158.111.21 22 UDP firewall rule means that the Int2 network interface will reject all requests and packets from 122.158.111.21 using the UDP protocol on port 22.

If you reboot a Xen-based container server from the console, the firewall rules for this container server will be lost, and you will need to update the firewall rules again.

Protocols:
For IPv4, only the ICMP, IPV6-ICMP, TCP, UDP, DCCP, SCTP protocols are available by default. However, if required, you can enable other protocols for IPv4.
1. Go to the /onapp/interface/config/network_protocols.yml file.
2. The list contains all protocols available (IPv4). Set 'true' for the required protocols.
3. Restart httpd by running one of the following commands:

```
service httpd restart
```

or

```
/etc/init.d/httpd restart
```

4. The protocols you have enabled are now available at Control Panel > Cloud > Container Servers > Label > Networking tab > Firewall while adding new firewall rules.

The following protocols can be enabled in the /onapp/interface/config/network_protocols.yml file:

<p>| | | | | |</p>
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<thead>
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<td>TLSP</td>
<td>AX.25</td>
<td></td>
</tr>
<tr>
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<td>IRTP</td>
<td>SKIP</td>
<td>IPIP</td>
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</tr>
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<td>ISO-TP4</td>
<td>CFTP</td>
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<td>SAT-EXPAK</td>
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<td>DCCP</td>
<td>IPPC</td>
<td>GMTP</td>
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</tbody>
</table>
8.3.11.4 Container Server IP Addresses

In the Networking > IP Addresses tab you can find the list of assigned IP addresses, allocate new IP addresses and rebuild a network.

To allocate a new IP Address to the container server:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the server you’re interested in.
3. Click the Networking > IP Addresses.
4. Click the Allocate New IP Address button.
5. Select a network interface from the drop-down menu (only the network interfaces you added to the container server will be available). The IP Address will be allocated automatically.
6. As an alternative you can manually select an IP address from the IP Pool associated with the network interface. To enable this option move the Specify IP Address slider to the right and choose IP Address from the drop-down list. You may select an IP address that's already assigned to a container server, but only one container server should be online at a time. Use Please show me used IP Pool, Show only my IPs and Show only IPv6 checkboxes to narrow the list of IP in the drop-down list.

7. Click the Add IP Address button.

8. Click the Rebuild Network button to rebuild the network.

You must rebuild the network after making changes to IP address allocations.

To remove an IP address from a container server:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the server you're interested in.
3. Click the Networking > IP Addresses tab.
4. Click the Delete icon next to the IP address you want to delete.
5. In the pop up window that appears:
   - Choose Delete with Reboot option if you want to reboot a container server and rebuild the network immediately after deleting the IP address. After choosing the Delete with Reboot option you will be redirected to the container server's Overview page.
   - Choose Delete without Reboot option if you don't want to reboot a container server. In this case to apply the changes, you will have to the reboot the container server additionally.

You can't delete an IP address that is in use.

8.3.11.5 Display Network Speed for Network Interfaces on Container Server Page
The main Container Servers screen displays the network speed of each container server's primary network interface. To see the speed of all interfaces assigned to a container server:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the server you are interested in.
3. Click the Networking > Network Interfaces.
4. On the screen that appears, the Port Speed column shows the network speed of the network interface.

8.3.11.6 Edit Container Server Network Speed
To edit a container server's network speed:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the server you want to change.
3. Go to the Network > Network Interfaces.
4. In the last column click the Edit button.
5. Change the port speed.
6. Click the Submit button to save changes.

8.3.12 Container Server Disks

Container server storage is provided by disks. A disk is a partition of a data store that is allocated to a specific container server. Disks can be assigned as standard or swap disks. They can also be set as primary (that is, the disk from which an OS will boot).

Managing disks for the entire cloud is handled through the Control Panel's Settings menu. Disks for individual container servers are managed through the Control Panel's Container Servers menu, where you can:

- See the list of disks allocated to this container server
- Add a new disk
- Resize a disk
- Migrate a disk
- Check disk usage statistics (IOPS)
- Delete a disk

Do not create multiple partitions on one disk for container servers. OnApp Control Panel supports only one partition per disk. In cases when you change disk partition, the CP might loose control of such a disk and the container server associated with it. If required, create additional disks instead.

8.3.12.1 Add Disks to Container Servers

Adding a disk to a container server will require that server should be rebooted. If a container server is running when you try to add a new disk to it, you'll be asked to confirm the reboot. To add a disk to a container server:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click a container server's label to open its details screen.
3. Click the Storage > Disks.
4. Click the + button or the Create Disk button.
5. Fill in the details:
   - Specify disk label.
   - Choose the data store to create a disk on from the drop-down list.
   - Move the slider to the right to specify the desired disk size.

   The disk size should not exceed 2 TB when a new disk is added. You can later resize the disk if you need it to be larger than 2 TB.

   - Move the Swap Space slider to the right if this disk is swap space.
   - Move the Require Format Disk slider to the right if this disk requires formatting.
   - Move the Mounted slider to the right if the disk should be added to FSTAB.
Specify its mount point. The maximum length of a Mount Point is 256 characters. Spaces are not allowed. No more than one slash is allowed. If the mount point is not specified the default mount point will be used:

/mnt/onapp-disk-{disk.identifier}

Indicate the file system - ext3 or ext4.

6. Click the Add Disk button to finish.

Restrictions:

- If you choose a Solidfire data store, the minimum disk size will be regulated by Solidfire Data Store Zone settings.
- If container server and the Control Panel server belong to different networks, the hot attach transaction will fail.
- If an additional disk has been created without the require format disk option and formatted/partitioned in another way, resize disk action may work incorrectly. Use the require format disk option when creating an additional disk, otherwise use disk resize option at your own risk.
- When you add a new disk to a container server, it automatically becomes available to that server.

8.3.12.2 Edit Container Server Disks

8.3.12.2.1 Primary and Swap disks
For primary and swap (Linux, FreeBSD) disks you may only change the label and the size. You can easily resize disks when needed. The resize will fail if your current usage is greater than the new size you request. Note, that any changes on disk size will lead to reboot of your container server.

You can only increase the size of container server disks.

To change disk size:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Make sure your container server is powered off, then click its label to open its details screen.
3. Click the Storage > Disks.
4. Click the Actions button next to the disk you want to change, then click the Edit link.
5. Enter a new disk label and size in GB in the fields provided.
6. Click the Save Disk button.

If you start Disk Resize transaction and then decide to cancel it, you will get the warning message. Click Proceed if you are sure that the resize is no
longer in progress. Otherwise stopping Disk Resize transaction can be a dangerous operation and side effects can include file system corruption.

8.3.12.2.2 New disks
For new disks - those which were added after the container server was created - you can edit the following:
- Label
- Size
- Require Format
- Mounted
- Mount Point
- File System

8.3.12.3 Migrate Container Server Disks
You can migrate disks of your container servers to other data stores, which are allocated to the same Compute resource. Unlike Container Server migration – disk migration requires reboot of the container server.

To migrate a disk:
1. Go to your Control Panel > Cloud > Container Servers menu.
2. Make sure your container server is powered off, then click its label to open its details screen.
3. Click the Storage > Disks.
4. Click the Actions button next to the disk you want to move to another data store, then click the Migrate button.
5. On the screen that appears, select a target data store from a drop-down box.
6. Click Start Migrate.

- You can only migrate disks to data stores in data store zones assigned to your bucket.
- You cannot migrate a disk to a data store with less capacity than the disk size.
- If you move a 850GB disk between aggregates with 10GB actual usage, the 'dd' image of the local volume manager will take 850GB space, because the entire local volume manager is copied, including zero 'd' space which may not be able to be recovered.

8.3.12.4 Delete Container Server Disks
To delete a disk:
1. Go to your Control Panel > Cloud > Container Servers menu.
2. Make sure your container server is powered off, then click its label to open its details screen.
3. Click the **Storage > Disks** tab.
4. Click the **Actions** button next to the disk you want to delete, then click **Delete**.
5. In the pop-up window, move the **Force Reboot** slider to the right, then select the container server shutdown type.
6. Move the **Required Startup** slider to the right to start up the container server automatically after the network is rebuilt.

Steps 5 and 6 apply to disks of container servers that are on.

7. Click the **Destroy Disk** button.

This will schedule the "destroy disk" transaction.

### 8.3.13 Container Server Statistics

For your convenience, the system tracks container server performance and generates statistics on:

- Container Server CPU Utilization
- Container Server Billing statistics
- Interface Usage
- Container Server Disk IOPS Statistics

#### 8.3.13.1 Container Server CPU Utilization

OnApp tracks CPU usage for container servers and generates charts that help analyze container server performance.

The charts show the total CPU usage for all the cores of this particular container server for a specified time period.

The vertical axis shows the CPU usage percentage (CPU percentage is the core-independent quantity). The horizontal axis defines a time period.

To see CPU usage statistics:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the container server you're interested in.
3. Click the **Overview > CPU Usage**.
4. On the screen that appears, the top chart shows CPU usage for the last 24 hours. The bottom chart shows usage for the last three months (if there is enough data). If there is less data available, the chart will show utilization for the time available.
5. Move the **Show in My Timezone** slider to the right if you want to show bandwidth statistics according to your profile's timezone settings.
6. To zoom into a time period, click and drag in a chart. Click the **Reset Zoom** button to zoom out again.
7. You can filter the statistics by date and time - select the time period from the drop-down menu and click the **Apply** button.
To see what percentage of Compute resource CPU resource a container server takes, go to your Control Panel > Cloud > Container Servers menu and click the label of the container server you're interested in. On the screen that appears, the CPU(s)/Shares parameter displays the amount of CPU resource given to this container server.

8.3.13.2 Container Server Billing Statistics

OnApp has a record of all the charges applied to your container servers for the last three month period. If a container server was created less than three months ago, statistics are recorded for the container server's existence to date. You can view all statistics available, or those for a shorter period by setting a Start and End time.

When generating billing statistics, OnApp takes the last state of the container server during the hour. For example, if a container server was turned on at 6.15 and turned off at 6.59 it will be considered as being off for the whole hour and its resources will be billed according to the OFF prices set in the bucket. However, the container server's disk and network interface usage can still be billed in case the container server was on during that hour.

To view billing statistics for a container server:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the server you're interested in.
3. Click the Overview > Billing Statistics tab.
4. You can filter the statistics by date and time - select the time period from the drop-down menu and click the Apply button. By default the statistics are generated for the last three months or the actual container server existence period.
5. Move the Show in my Timezone slider to the right if you want to view billing statistics according to your profile's timezone settings. By default, billing statistics is shown in UTC.
6. On the page that appears:

   - **Date** – particular date and time for the generated statistics
   - **Users** – the container server owner. Click the owner name to see the User Profile (user details)
   - **Virtual Servers** – the container server name with the total due for container server resources (CPU priority, CPUs, memory and template resources) for the point of time specified in the Date column.
   - **Network Interfaces Usage** – the total due for the network interfaces used by this container server for the point of time specified in the Date column. Click the network interface name to see its details.
Disks Usage – the list of disks assigned to this container server with the total due for the "data_read", "data_written", "reads_completed", "writes_completed" resources for particular disk. The charges for the disk size resource are included into the Costs column.

Costs – the total due for the Container Servers, Network Interfaces and Disks resources at the point of time specified in the Date column.

Scroll down to see Total Amount (the total due for the whole billing statistics period).

8.3.13.3 Container Server Network Interface Statistics
OnApp tracks network usage for container servers and generates charts that help analyze network performance. To see network utilization statistics for a container server:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the container server you're interested in.
3. Click the Networking > Network Interfaces tab.
4. Click the Statistics (chart) icon next to the network you're interested in.
5. On the screen that appears, the top chart shows bandwidth usage in megabits per second (Mbps) for the last 24 hours. The bottom chart shows usage for the last three months.
6. To zoom into a time period, click and drag in a chart. Click the Reset zoom button to zoom out again.
7. You can filter the statistics by date and time - select the time period from the drop-down menu and click the Apply button.

8.3.13.4 Container Server Disk IOPS Statistics
The system tracks IOPS (Input/Output Operations per Second) for container servers and generates charts that help analyze container server disk performance. The data presented in the chart are for the periods during which the statistics was gathered, typically 3 minutes. To see IOPS for a container server:

1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the container server you're interested in.
3. Click the Storage tab > Disks tab.
4. Click the Actions button next to the required disk, and then choose IOPS.
5. There are four charts on the screen that appears:
   - IOPS for the last hour
   - IOPS for the last 24 hours
   - Data written/read (in Kb) for the last 24 hours
   - Data written/read (in Kb) for the last hour
6. To zoom into a time period, click and drag in a chart. Click the Reset Zoom button to zoom out again.
7. You can filter the statistics by date and time - select the time period from the drop-down menu and click the Apply button.
The OnApp API allows you to limit the Hourly IOPS and Hourly data by setting the limit=N parameter, where the N variable is the number of hours for which the charts will display the info.

### 8.3.14 Container Server Integrated Console

OnApp provides an integrated VNC console that gives users direct access to their container servers through the Control Panel UI. The noVNC console is provided for container servers that are built on KVM CentOS 7 based on WebSockets. The console connects a user browser to a VNC port or VNC WebSocket port available via a compute resource for the guest console.

To access the container server VNC console via the Control Panel:

1. Go to the **Cloud > Container Servers** menu.
2. Click a label of a destination container server.
3. Click the **Console** button.

For the HTML5 console, click the **Re-connect** button if the connection is lost. The re-connection to the console runs as follows:

- If the console runs as expected, clicking the **Re-connect** button causes disconnection and the console is re-connected automatically after 1.5 seconds.
- If the console gets stuck, clicking the **Re-connect** button runs your request once again and re-connects the console without reloading.
- If the console gets disconnected with a status code and an error message, the console is re-connected automatically after 1.5 seconds.

### 8.3.15 Container Server Transactions and Logs

The system records a detailed log of all the transactions happening to your container servers. The list of transactions logged by the system includes:

- Provision container server
- Startup container server
- Stop container server
- Resize container server without reboot
- Configure Operating System
- Build disk
- Resize disk
- Format disk
- Destroy disk
• Destroy container server
• Destroy template
• Download template
• Update firewall

To view transactions for a container server:
1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the container server you're interested in.
3. The details screen for that container server shows recent transactions in the Activity Log section.

To cancel pending tasks, click the Cancel Pending button.

You can also view the details of a particular log item by clicking its Ref number. The page that loads shows the log output and the following details:
• date - time in the [YYYY][MM][DD][hh][mm][ss]Z format
• action - the action name
• status - the action status (Complete, Warn, Pending, or Failed)
• ref - the log item's Ref number
• target - the action target
• started at - the time when the action was started
• completed at - the time when the action was completed
• template - template of the server the action refers to
• compute resource - the label of compute resource
• initiator - the user who initiated the action

If you want to see only the detailed output, you can hide log info with the arrow button in the upper right corner.
8.3.16 Container Server Recipes

To manage container server recipes:
1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the server you're interested in.
3. Click the Overview tab, then choose Recipes.
4. The screen that follows shows details of all the recipes in the cloud:

- The left pane shows the list of available recipes organized into recipe groups.
- The right pane displays the list of events to which the recipes can be assigned to. Click the arrow button next to event to expand the list of recipes assigned to it.

Assign recipe

Use drag and drop feature to assign recipe to a desired event.

You can assign container server recipes to the following events:
- **VS provisioning** - run the recipe during the virtual server provisioning
- **VS network rebuild** - run the recipe while rebuilding a network
- **VS disk added** - run the recipe while adding a disk to the virtual server
- **IP address allocated for VS** - run the recipe when adding an IP address to the VS network interface
- **IP address revoked from VS** - run the recipe when removing an IP address from the VS network interface
- **VS network interface added** - run the recipe while adding a network interface to the virtual server
- **VS network interface removed** - run the recipe while deleting a network interface from the virtual server
- **VS disk resized** - run the recipe while resizing a virtual server disk
- **VS resize** - run the recipe while resizing the virtual server
- **VS IP address add** - run the recipe while adding an IP address the virtual server
- **VS IP address remove** - run the recipe while removing an IP address from the virtual server
- **VS start** - run the recipe while starting the virtual server
- **VS reboot** - run the recipe while rebooting the virtual server
- **VS hot migrate** - run the recipe during the hot migration of the virtual server
- **VS hot full migrate** - run the recipe during the hot migration of the virtual server with disk
- **VS failover** - run the recipe during the failover process

To use drag and drop:
1. Click the arrow button in front of the required event to unfold it.
2. Select the required recipe in the left pane and hold it down with the left mouse button.
3. Drag the recipe up to the right pane and release the mouse button to drop the recipe and add it to the required event.

Remove recipe

To remove recipe:
1. Click the arrow button in front of the required event to view the list of recipes assigned to it.
2. Click the **Delete** button next to the recipe you want to remove.

### 8.3.17 Container Server Recipe Custom Variables

You can define custom variables for particular container servers. Each custom variable is a name-value set that can be used during the container server recipe implementation. Custom variables are set on a per server basis. You can create custom variables during the container server creation or via the container server **Overview** menu.

To create a new custom variable:

1. Go to your Control Panel > **Cloud** > **Container Servers** menu.
2. You'll see a list of all container servers in your cloud. Click the name of a server for which you want to create a variable.
3. On the container server details screen, click the **Overview** tab, then choose **Recipes Variables**.
4. On the screen that appears, click the + button.
5. Specify the recipe name and its value.
6. Move the **Enabled** slider to the right to allow use of this recipe.
7. Click **Save**.

To edit a custom variable, click the **Edit** icon next to the required variable and change its details.

To delete a custom variable, click the **Delete** icon next to the variable you want to remove. You will be asked to confirm the deletion.

It is possible to set custom variables for image templates, as well as for container servers.

**Note:** container server custom variables will always overlay template custom variables.

### 8.3.18 Container Server Backup Schedules

You can schedule backups of container servers (server disks) as required. For example, you can set up a schedule to back up your disks once a week. Scheduled container server backups enable specific backups to be scheduled for individual servers. OnApp supports only normal backups for container servers, which include all the data from from the server's disk.

#### 8.3.18.1 View Container Server Backup Schedules

To view the list of backup schedules for a container server:

1. Go to your Control Panel > **Cloud** > **Container Servers** menu.
2. Click the label of the container server you’re interested in.
3. Click the **Storage** tab, then select **Disks**.
4. On the screen that appears, click the **Actions** button next to the disk you want to back up, then select **Schedule for Backups**.
5. On the screen that appears, you will see the list of backup schedules along with their details:

- **Date** - time when the schedule was created
- **Target** - the disk for which the schedule was created
- **Action** - scheduled action
- **Frequency** - how frequently the backup will take place according to the period set. For example, frequency of 2 and a period of days will take a backup every 2 days
- **Period** - backup period: days, weeks, months or years
- **Rotation period** - number of backups after which the first backup will be deleted

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

- **Next Start** - the date and the hour of the next backup
- **User** - user who created the backup schedule
- **Status** - schedule status
- **Actions** - click the **Actions** icon to edit or delete the backup schedule

**On this page:**

- View Container Server Backup Schedules
- Create Container Server Backup Schedule
- Edit Container Server Backup Schedule
- Delete Container Server Backup Schedule

**See also:**

- Virtual Servers
- Smart Servers
- Container Servers
- Compute Resources

8.3.18.2 Create Container Server Backup Schedule

To add a backup schedule:

1. Go to your Control Panel > **Cloud** > **Container Servers** menu.
2. Click the label of the container server you want to schedule a backup for.
3. Click the **Storage** tab, then select **Disks**.
4. On the screen that appears, click the **Actions** button next to the disk you want to back up, then select **Schedule for Backups**.
5. On the screen that follows, click the **New Schedule** button.
6. Specify schedule details:
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - **Rotation period** - number of backups after which the first backup will be deleted.

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

   - **Start time** - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).
   - **Enabled** - whether this backup schedule should be enabled or not

7. Click the **Save** button to finish.

8.3.18.3 Edit Container Server Backup Schedule

To edit a backup schedule:

1. Go to your Control Panel > **Cloud** > **Container Servers** menu.
2. Click the label of the container server you want to schedule a backup for.
3. Click the **Storage** tab, then select **Disks**.
4. On the screen that appears, click the **Actions** button next to the disk you want to back up, then select **Schedule for Backups**.
5. Click the **Edit** icon next to a schedule to change its details.
6. Specify schedule details:
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - **Rotation period** - number of backups after which the first backup will be deleted.

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.
in the system.

- **Start time** - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).

- **Enabled** - move the slider to enable or disable the schedule

For a schedule with the **Failed** status, you can move the **Enabled** slider to the right to run the schedule once again.

7. Click the **Save** button to finish.

8.3.18.4 Delete Container Server Backup Schedule

To delete a backup schedule:

1. Go to your Control Panel > **Cloud** > **Container Servers** menu.
2. Click the label of the container server you’re interested in.
3. Click the **Storage** tab, then select **Disks**.
4. On the screen that appears, click the **Actions** button next to the disk with a backup schedule, then select **Schedule for Backups**.
5. Click the **Actions** icon next to the schedule you want to remove, then choose **Delete**.

8.3.19 Container Server Backups

OnApp supports normal backups for Container Servers. Normal backups contain all the information stored on a server’s disk. If you have switched on incremental backups for the cloud, normal backups will still be made for container servers. For detailed information on backups refer to **Virtual Server Backups**.

Backups in the OnApp Control Panel are associated with a particular user instead of being associated with a server. To view the list of user backups, refer to **View User Backups** section.
8.3.19.1 View Container Server Backups

To view the list of container server's backups:
1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the required container server.
3. Click the Backups tab, then select Images. Images are full backups of container server disks.
4. On the screen that appears, you'll see a list of container server backups.
5. Click the label of the required container server backup to see the following tools - restore backup, delete backup and add/edit note.

8.3.19.2 Take Container Server Disk Backups

To back up an container server disk:
1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the server you want to back up.
3. Click the Storage tab and select Disks. You'll see a list of the disks allocated to that container server.
4. Click the Actions icon next to a disk you want to take a backup of, then click Backup. You'll see a list of all the backups taken and pending for that disk, along with the tools to restore backups and delete them.
   - To make a backup, click the Take a Backup button at the end of the list. If required, you can add a note to a new backup. You can also select Force Windows Backup.

This option for Windows servers is designed as a last resort, when the backup cannot be taken due to NTFS file system problems. Switching on this option will bring up a dialog box with the following message: "If you enable this option there is no guarantee that backup will be consistent."

Select "Yes" to proceed.
8.3.19.3  Restore Container Server Backup  
To restore a backup:
1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the required container server.
3. Click the Backups tab, then select Images.
4. On the screen that appears, click the Actions icon next to the backup you want to revert to and choose Restore.

8.3.19.4  Delete Container Server Backup  
To delete a backup:
1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the required container server.
3. Click the Backups tab, then select Images.
4. On the screen that appears, click the Actions icon next to the backup you want to remove and choose Delete.

8.3.19.5  Add Container Server Backup Note  
To add/edit container server backup's note:
1. Go to your Control Panel > Cloud > Container Servers menu.
2. Click the label of the required container server.
3. Click the Backups tab, then select Images.
4. On the screen that appears, click the Actions icon next to the required backup and choose Add Note. Make necessary changes and click Submit.

8.4  VMware Virtual Servers

Virtual servers running on VMware compute resources are managed almost the same as normal virtual servers. The only difference is that publishing rules are used instead of firewall rules and backups are replaced by snapshots. Also, as the VMware cluster is displayed as a pool of resources rather than per compute resource.
OnApp Cloud gives you high-end cloud management features including:

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</tbody>
</table>

Certain VS operations are unavailable in OnApp with VMware:

- *Reboot in recovery*
- *Segregate*
- *VIP status*
- *Autoscaling*
- *Migrate VS.* VMware utilizes vMotion to ensure that the VSs are optimally placed on the compute resources
- *Backups*. Backup process for VMware virtual servers differs from the standard OnApp backup scheme. See *VMware VS Snapshots* section for details.
- *Firewall* for VMware VSs is presented with publishing rules. See *Publishing Rules* section for details.
- It is not possible to gather IOPS statistics for VMware virtual servers.
- Use of IPv6 is not supported for VMware virtual servers.

NOTE: Performing the following VS operations at vCenter may lead to performance inconsistencies. Please, do not execute the following actions in vCenter:
- Power VSs ON and OFF
- Pause and Unpause VSs
- Edit the Properties for any VS
- Create and delete Snapshots
- Make changes to the distributed VSwitch
- Remove templates from the data store
- Rename templates
- Delete the services account on the virtual server
- Remove or stop VMWare tools on the virtual server

Performing the following actions in vCenter will not affect OnApp:

- Migrate VSs between compute resources using VMotion
- Migrate VSs between data stores using Storage VMotion
- Place compute resources into maintenance mode
- Make changes to compute resources when in maintenance mode
- Back up VSs using third party tool (e.g. Veeam)
- Enable, Disable or make changes to DRS

### 8.4.1 View VMware Virtual Server Details

To view details of a specific VMware virtual server:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. The screen that appears loads the VS properties, notes, activity log and tools for managing your virtual server.

#### 8.4.1.1 VS Properties

VS properties page gives general overview of the VS details:

- Template this VS is built on
- Power status & On/Off/Reboot buttons.

Clicking the OFF button performs graceful shutdown and then powers off the virtual server after the timeout set in Configuration settings.

- **FQDN** (fully qualified domain name)
- **Compute resource.** Click the compute resource name to see its details
- **Login credentials**
- **Owner.** Click the owner name to see its details.


- **VIP status (on/off)**. Click the icon to change the status.
- **Estimated Price per hour**. This sum does not take into consideration the free limits for resources set in the bucket. Therefore, the final price for the server might differ from the sum indicated here.
- **Memory**
- **CPU(s)/shares**
- **Disk Size**
- **Disk backups**
- **Network Speed**
- **IP Addresses**. Only the first five IP addresses are displayed on the virtual server properties page. To view the list of all virtual server IP addresses, mouse over IP addresses area or go to the Networking > IP addresses tab.
- **Autoscale** - move the slider to enable/disable the autoscaling rules set for this VS.
- **Auto-backups** - move the slider to enable/disable automatic backups for this VS.

If the automation options weren't enabled during this virtual server creation, you'll be redirected to the form where you can configure them.

8.4.1.2 Notes
The Notes section lists brief comments or reminders for a VS. You can add either admin's or user's notes. The admin's note will be available to cloud administrators. Click the Actions button in the Notes section of the page to add admin's or user's note.

8.4.1.3 VS Management
- Click the Tools button to expand the Tools menu with the VS management options.
- Use the top menu to manage your virtual servers' statistics/networking/storage options.

8.4.2 Create VMware Virtual Server
To create a VMware virtual server:
Go to your Control Panel > Cloud > Virtual Servers menu and press the "+" button, or click the Create New Virtual Server button at the bottom of the screen. Fill in the VS creation form step by step:

**Step 1 of 5. Templates**
1. Click the required Operating system label (Windows, Linux or FreeBSD) to expand the list of template group.
2. **Distribution** - choose a template Distribution
3. **Template** - select the template
4. Click Next.

1. You can use RHEL, Windows and Debian templates to create VMware virtual servers. For details how to create VMware templates, refer to [Create Template for VMware Virtual Server] section.
2. To be able to use Ubuntu templates later than 9 version for VMware
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For virtual server creation, you need to remove the absolute pathnames in /etc/pam.d/vmtoolsd file. For example: /lib/security/pam_unix.so > pam_unix.so

3. Please make sure that the Windows password policy defined inside the template is compliant with the password policy set in the OnApp CP. This will ensure that there are no password related issues when provisioning Windows.

Windows Licensing Type
This option only appears if your bucket allows it, and if the relevant licensing options have been configured for the template group this template belongs to.

If this option is available, choose the license type you require:
- For the KMS type, choose the licensing server
- For your own license, type your license key

If you don't specify the licensing type, MAK licensing will be set by default.

It is possible to deploy Windows virtual servers without running sysprep. To do so, you need to disable the Run Sysprep option for the compute zone the virtual server will be built on.

It is not possible to set VS password when creating a Windows-based VMware virtual server without running a sysprep.

Step 2 of 5. Properties
You can create a virtual server having specified only the required parameters and configure it later. Specify the following virtual server properties:
- **Label** - the label of the virtual server. The required parameter.
- **Hostname** - the hostname of the virtual server. The required parameter. The hostname should consist of letters [A-Z a-z], digits [0-9] and dash [-]. For more info on hostname validation, refer to [RFC standard documentation](https://tools.ietf.org/html/rfc1123).
- **Compute zone** - the compute zone to build the VS on.
- **Compute resource** - the specific VMware compute resource to build the VS on.
- **Password** - a secure password for the VS. It can consist of 6-99 characters, letters [A-Za-z], digits [0-9], dash [-] and lower dash [ _ ], and the following special characters: ~ ! @ # $ * _ + = \ ` { } [ ] : ; ' , . ? / . You can use both lower- and uppercase letters.
- **Password confirmation** - repeat the password to confirm it.
- **Encrypt password** - move the Encrypt Password slider to the right, to encrypt your password, then enter an encryption key in the field that appears.
- **Click Next**.

Step 3 of 5. Resources
- **RAM** - set the amount of virtual server's RAM.
- **CPU Cores** - set the amount of virtual server's CPU cores.
- **CPU Priority** - set virtual server's CPU priority.

The amount of CPU resource a VS is given is the CPU priority (you can think of this as its "share percentage") multiplied by the number of cores allocated to that VS. This is a minimum number – clients can burst over it, up to 100% multiplied by the number of cores. For example, on a compute resource with 3GHz CPU cores:

- 100% x 1 core = 3GHz (burstable to 3GHz)
- 10% x 2 cores = 600MHZ (burstable to 6GHz)
- 5% x 4 cores = 600MHz (burstable to 12GHz)

By default, OnApp allows overselling of cloud resources. For example, OnApp will allow users to create 5 VSs with 100% CPU priority/1 CPU core on a compute resource with a 4-core CPU. In this example, OnApp would reduce the guaranteed CPU for each VS.

**Primary disk**
- **Data Store Zone** - choose a data store zone for this VS's primary disk.
- **Primary disk size** - Set the primary disk size.

**Swap disk**
- **Data Store Zone** - choose a data store zone for this VS's swap disk.
- **Swap disk size** - set the swap disk size. There is no swap disk for Windows-based VSs. In all other cases, swap disk size must be greater than zero.

**Network configuration**
- **Network** - choose a customer network from the drop-down list.
- **Port Speed** - set virtual server port speed.
- **Click Next.**

**Step 4 of 5. Recipes**
1. Choose a recipe you want to assign to this virtual server by dragging the required recipe to the **Assigned recipes** pane.
2. To add a custom variable, click the "+" button next to the **Custom recipe variables** title bar, then specify the variable's details:
   - Enter the recipe's name and its value.
   - Move the **Enabled** slider to the right to allow use of this variable.
3. **Click Next.**

**Step 5. Confirmation**
- **Move the Build Virtual Server** slider to the right, if you want the system to automatically build the VS. If you leave this box blank, you will have to build your server manually after it is created.
• Move the **Boot Virtual Server** slider to the right, if you want the virtual server to be started up automatically.

**OnApp must be preconfigured, before VMware VSs can be created. A Vyatta firewall must be configured and available for the cloud before creating any virtual server. As all customer virtual servers are organized into VLAN’s, with Vyatta acting as the VS gateway.**

Click the **Create Virtual Server** button to start the creation process. You will be taken to the virtual server details screen.

### 8.4.3 Edit VMware Virtual Server

You can edit CPU and RAM resources for all VSs. Depending on the OS it is built on, some VSs can have their CPU and RAM resized without needing to be powered off ("resize without reboot").

Windows 2008 and Windows 7 VSs can be resized without rebooting. With Linux, it depends on kernel. E.g. CentOS with kernel 2.6.18 can be resized; Ubuntu cannot. Whether a template allows resize without reboot is shown on the main Templates menu screen.

To adjust VS CPU & RAM resources:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the server you want to resize, to show its details screen.
3. Click the **Tools** button and select the **Edit Virtual Server** link.
4. Change CPU core/priority and RAM values , and click the **Save Virtual Server** button:

• If the VS template allows resize without reboot, the resize should be completed automatically: you will be returned to the VS details screen and see a message indicating
the resize was successful. If the template does not allow this, you will be asked to confirm that the VS will need rebooting so that the resize can take place.

### 8.4.4 Delete VMware Virtual Server

Shut down the VS before destroying it. If you are deleting a VS that is running, the VS will be deleted after the time set in Timeout Before Shutting Down VSs configuration parameter.

To remove the virtual server from the cloud:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. On the screen that appears, you'll see the list of all virtual servers in the cloud. Click the label of the virtual server you want to delete.
3. On the VS's screen, click the Tools button, then select Delete Virtual Server.
4. Move the Move the Last backup to my templates if it is present slider to the right if you want to save the last VS's backup as a template.
5. Move the Destroy All Existing Backups slider to the right if you want to remove all existing backups of this virtual server.
6. Click the Destroy button.

- You won't be able to restore a VS after deleting it.
- Deleting a virtual server removed all data stored on that VS. To save data, saved on the VS, back up your virtual server and move the Move the Last backup to my templates if it is present slider to the right when following the instructions described in this section.
- Backups are deleted automatically when the virtual server is deleted. To prevent backups from deletion, please contact the support. This will fill up your disk over time and requires administrator assistance to change the current behavior.

### 8.4.5 Build VMware Virtual Server Manually

To build/rebuild virtual server build/rebuild virtual server must be enabled. This is a new permission which manages build/rebuild functionality independently from update virtual server permission which used to regulate the build/rebuild options in the previous versions.

If you haven't checked the Build Virtual Server Automatically option during the VS creation process, you will have to do this manually after the VS has been created. Building a virtual server is the process of allocating physical resources to that VS.
To build a virtual server manually:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. On the screen that appears, click the Tools button and then click Rebuild Virtual Server.
4. On the screen that pops up, use the drop-down menu to choose a template with which to build the VS.
5. Tick the Required Start Up box to have your VS started automatically after it is built.
6. Click the Build Virtual Server button to finish.

8.4.6 VMware Virtual Server Power Options
To manage VMware virtual server power options:
1. Go to your Control Panel > Cloud > Virtual Server menu.
2. Click the label of the required virtual server.
3. Click the Tools button on the VS's screen to expand the VS Tools menu.
4. The Tools menu enables you to perform the following power actions on VSs (the exact list shown depends on the VS status):
   - Reboot Virtual Server - powers off and then restarts the VS.
   - Suspend Virtual Server - stops a VS, changes its status to suspended and disables all the other actions on VS, unless unsuspended.
   - Shut Down Virtual Server – pops up a dialogue box, where you can either Shut Down VS (terminates the VS gracefully), or Power Off VS (terminates the VS forcefully).
   - Startup Virtual Server - queues a start-up action for a VS that's currently powered off.
   - Startup on Recovery - starts the VS in recovery mode with a temporary login ("root") and password ("recovery") for servers where password encryption is enabled. For servers with password encryption disabled, the root password will be used to start in recovery.

8.4.7 VMware Virtual Server Administrative Options
To manage a virtual server power options:
1. Go to your Control Panel > Cloud > Virtual Server menu.
2. Click the label of the VS in question.
3. Click the Tools button on the VS's screen to expand the VS Tools menu.
4. The Tools menu enables you to perform the following administrative actions on VSs:
   - Reset Root Password - resets the root password for this VS (the password is displayed in VS Information).
   - Set SSH keys – assigns SSH keys of the admin and a VS owner to the VS. If a VS owner does not have any SSH keys, the system will only assign admin keys.
Edit Administrator's note - makes an optional note, which will be displayed in VS information.

8.4.8 VMware Virtual Server Integrated Console

OnApp includes an integrated VNC console that gives users direct access to their virtual servers through the OnApp Control Panel, if their user role permits. The console connects the user's browser to the VNC port made available via the compute resource for the guest console. The end user web UI offers a console connection, regardless of the OS.

To access the virtual server VNC console via the control panel interface:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. On the screen that appears, click the Console button in the upper menu.

For HTML5 console, use the Re-connect button if the connection got lost:
- If console running in normal state, pressing re-connect button will cause disconnect, and it will be re-connected automatically after 1.5 seconds.
- If console got stuck, pressing re-connect button will send all the information once again and will re-connect without page reload.
- If console got disconnected with any status code, and red lane with error message revealed, it will be re-connected automatically after 1.5 seconds.

To switch from HTML5 to Java console, go to Admin > Settings > Configuration menu.

We recommend using Java 1.7, since OnApp VNC console was not tested with Java 1.8.

In case the console is not connected, perform the following steps to fix this problem:
1. Check if MySQL is configured with the enough max_connections option. Run "SHOW PROCESSLIST" to get number of current connections and "SHOW VARIABLES LIKE 'max_connections' to check the configured connection limit. If the max_connections value is deficient, increase it.
2. Open the /etc/httpd/conf.d/onapp.conf file and check the DBDPersist variable value in (normally, the DBDPersist is set to On). Change the DBDPersist value to "DBDPersist Off".

PLEASE NOTE: Disabling the DBDPersist make result in slower connection to VNC console.

8.4.9 VMware Virtual Server Transactions and Logs

The system records a detailed log of all the transactions happening to your virtual servers. The list of transactions logged by the system includes:
- Provision virtual server
- Startup virtual server
- Stop virtual server
- Resize virtual server without reboot
- Configure Operating System
- Build disk
- Resize disk
- Format disk
- Destroy disk
- Take backup
- Convert backup
- Restore backup
- Destroy backups
- Destroy virtual server
- Destroy template
- Download template
- Update firewall

To view transactions for a virtual server:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. The details screen for that virtual server shows recent transactions in the Activity Log section. To view more transactions, click the More Logs button.

To cancel pending tasks, click Cancel All Pending Tasks for this virtual server.

8.4.10 VMware Virtual Server Networks

The Networking menu in the Virtual Servers menu enables you to manage network interfaces, allocate IP addresses and set publishing rules for VSs.

8.4.10.1 Configure VMware Virtual Server Network Interface

The Networking > Network Interfaces menu shows the virtual network interfaces allocated to this VS. Network interfaces join the physical network to the VS. When you create a VS a network interface is added automatically. This network interface will be assigned to the existing physical network using a spare IP (IPv4) and will be set primary by default.

OnApp supports IPv4 and IPv6. Since not every application supports IPv6, at least one IPv4 address must be allocated to a VS's primary network interface.

To see the list of all network interfaces allocated to the VS:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Networking tab, then click Network Interfaces.
4. On the page that follows you will see the following fields:

- Interface – optional label of the network interface.
- Network join – name of the network and a compute resource or compute zone this network is joined to.
- Port speed – the speed set to the interface.
- Primary interface – indication whether the interface is primary or not.
Here you can also view Interface Usage, Edit and Delete network interface (using icon controls) and Add a new network interface using the button at the bottom of the screen.

To add a network interface:
1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you're interested in.
3. Click the **Networking** tab, then click **Network Interfaces**.
4. Click the **Add New Network Interface** button at the bottom of the screen.
5. On the screen that appears, input values for the following parameters:
   - **Label** – a human-friendly name for the new interface.
   - **Physical Network** – choose a network join from the drop-down menu, which lists network joins assigned to the compute resource/compute zone on which the VS runs).
   - **Port speed** – set port speed in Mbps, or make it unlimited.
6. Click the **Add Network Interface** button.

To edit network interface label, port speed or set it as primary (if none is marked as primary), click **Edit** icon next to the appropriate network interface. After editing the port speed, the virtual server should be power cycled for the change to take effect.

To delete a network interface, click the **Delete** icon next to the interface you want to delete.

To run the VS, at least one network interface with an assigned IP address (or addresses) is required!

To allocate another physical network, add a new network interface.

---

**8.4.10.2 Rebuild VMware Virtual Server Network**

To rebuild network join, added to the virtual server (required after allocating new IP addresses):
1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of a required VS.
3. On the screen that appears, click the **Tools** button, then click **Rebuild Network**.
4. In the pop-up window that appears, move the **Force Reboot** slider to the right, then select the VS shutdown type:
   - Power OFF virtual server
   - Shutdown virtual server
   - Gracefully shutdown virtual server
5. Move the **Required Startup** slider to the right to start up the VS automatically after the network is rebuilt.
6. Click the **Rebuild Network** button.

---

**8.4.10.3 Publishing Rules**

If the VMware virtual server is running within a customer network, it is necessary to enable Internet access to this virtual server. Virtual servers running within customer network are
invisible, as customer networks utilize local IP addresses and Vyatta is used to reroute/NAT traffic.

To publish a VS port, you have to configure a publishing rule for the VS. Publishing rules function as destination NAT, making virtual servers accessible from outside. When creating a publishing rule for a virtual server, you select a new public IP for this VS, where the Vyatta will NAT incoming requests from this public IP to the private address of the server.

8.4.10.3.1 View the List of Publishing Rules
To see the list of all publishing rules allocated to the VS:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the required virtual server.
3. Click the Networking tab, then click Publishing Rules.
4. On the page that follows, you will see the list of all publishing rules allocated to this virtual server, along with their details:

- Rule
- Outside IP Address
- Port
- Protocol

8.4.10.3.2 Create Publishing Rule
VTo create a new publishing rule:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the required virtual server.
3. Click the Networking tab, then click Publishing Rules.
4. On the page that follows, fill in the form that appears:

- Set the port for which this rule will be effective.
- Select the protocol type - TCP or UDP.
- Specify the outside IP address - this can be a compute resource's IP, virtual server's public IP or a free public IP address.
- Tick the Use customer network address check box to use IP address from the customer network this VS is assigned to.
- If the customer network is not selected, choose an external IP address from the drop-down box.
- Click Save.

8.4.10.3.3 Delete Publishing Rule
To delete a publishing rule:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the required virtual server.
3. Click the Networking tab, then click Publishing Rules.
4. On the page that follows, click the Actions button next to the publishing rule you want to delete, then choose Delete.

8.4.10.4 Allocate/Remove VMware Virtual Server IP Addresses
In the Networking > IP Addresses tab you can find the list of assigned IP addresses, allocate new IP addresses and rebuild a network.
To allocate a new IP Address to the VS:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Networking tab, then click IP Addresses.
4. Click the Allocate New IP Address button.
5. Select a network interface from the drop-down menu (only the network interfaces you added to the VS will be available)
6. Select an IP address from the IP Pool associated with the network interface. You may select an IP address that's already assigned to a VS, but only one VS should be online at a time.
Use Please show me used IP Pool, Show only my IPs and Show only IPv6 checkboxes to narrow the list of IP in the drop-down list.
7. Click the Add IP Address button.
8. Click the Rebuild Network button to rebuild the network.

You must rebuild the network after making changes to IP address allocations.

To remove an IP address from a VS:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Networking > IP Addresses tab.
4. Click the Delete icon next to the IP address you want to delete.
5. In the pop up window that appears:
   - Choose Delete with Reboot option if you want to reboot a VS and rebuild the network immediately after deleting the IP address. After choosing the Delete with Reboot option you will be redirected to the VS's Overview page.
   - Choose Delete without Reboot option if you don't want to reboot a VS. In this case to apply the changes, you will have to the reboot the VS additionally.

PLEASE NOTE: You can't delete an IP address that is in use.

8.4.10.5 Display Network Speed for Network Interfaces on VMware Virtual Server Page
The main Virtual Servers screen displays the network speed of each VS's primary network interface. To see the speed of all interfaces assigned to a VS:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you are interested in.
3. Click the Networking > Network Interfaces tab.
4. On the screen that appears, the Port Speed column shows the network speed of the network interface.

8.4.10.6 Edit VMware Virtual Server Network Speed
To edit a VMware virtual server's network speed:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Select the virtual server you want to change.
3. Go to the Network > Network Interfaces, and edit the network speed accordingly.
4. Click the Save Network Interface button to save changes.

8.4.11 VMware Virtual Server Disks
Virtual server storage is provided by disks. A disk is a partition of a data store that is allocated to a specific virtual server. Disks can be assigned as standard or swap disks (there are no swap disks for Windows based templates). They can also be set as primary (that is, the disk from which an OS will boot).

Managing disks for the entire cloud is handled through the Control Panel's Settings menu. Disks for individual virtual servers are managed through the Control Panel's Virtual Servers menu, where you can:

- See the list of disks allocated to this VS
- Add a new disk
- Resize a disk
- Check disk usage statistics (IOPS)
- Delete a disk

8.4.11.1 Add Disks to VMware Virtual Servers
Adding a disk to a virtual server will require that VS to be rebooted. If a VS is running when you try to add a new disk to it, you'll be asked to confirm the reboot. To add a disk to a virtual server:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click a VS's label to open its details screen.
3. Click the Storage > Disks.
4. Click the Add New Disk button.
5. Fill in the details:
   - Specify disk's label
   - Choose the Data Store to create a disk on from the drop-down menu.
   - Set the desired disk size.
   - Specify if this disk is swap space, and requires formatting.
   - Specify whether the disk should be added to Linux FSTAB, and its mount point.
   
   The maximum length of a Mount Point is 256 characters. Spaces are not allowed. No more than one slash is allowed.
6. Click the Add Disk button to finish.

When you add a new disk to a virtual server it will automatically become available to that server.

8.4.11.2 Edit VMware Virtual Server Disks
You can easily resize disks when needed. The resize will fail if your current usage is greater than the new size you request. Note, that any changes on disk size will lead to reboot of your VS.

To change disk size:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Make sure your virtual server is powered off, then click its label to open its details screen.
3. Click the Storage > Disks.
4. Click the Actions button next to the disk you want to change, then click the Edit link.
5. Enter a new disk label and size in GB in the fields provided.
6. Click the Save Disk button.

8.4.11.3 Migrate VMware Virtual Server Disks
You can migrate disks of your virtual servers to other data stores, which are allocated to the same compute resource or compute zone. Unlike VS migration – disk migration requires reboot of the VS (despite the template it is based on).

To migrate a disk:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Make sure your virtual server is powered off, then click its label to open its details screen.
3. Click the Storage > Disks.
4. Click the Actions button next to the disk you want to move to another data store, then click the Import link.
5. On the screen that appears, select a target data store from a drop-down box.

You can only migrate disks to data stores in data store zones assigned to your bucket.

6. Click Start Migrate.

You cannot migrate a disk to a data store with less capacity than the disk size!
If you move an 850GB disk between aggregates with 10GB actual usage, the ‘dd’ image of the local volume manager will take 850GB space, because the entire local volume manager is copied, including zero ‘d’ space which may not be able to be recovered.
8.4.11.4  Delete VMware Virtual Server Disks
To delete a disk:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Make sure your virtual server is powered off, then click its label to open its details screen.
3. Click the Storage > Disks tab.
4. Click the Actions button next to the disk you want to delete, then click Delete.

8.4.12  Manage VMware Virtual Server Backups
Under VMware backups utilize the VMware snapshot tools and are performed by simply locking the filesystem disk (vmdk) and creating a new VMware disk with the changes made alongside. So the backup procedure for virtual servers running under VMware looks like: vmdk + vmdk(1) + vmdk(#).

8.4.12.1  VMware Virtual Server Snapshots
VMware snapshot tools are used to perform snapshots by simply locking the filesystem disk (vmdk) and creating a new VMware disk with the changes made alongside, so the backup procedure for virtual servers running under VMware looks like: vmdk + vmdk(1) + vmdk(#).

To view the list of VS Snapshots:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the server you want to back up.
3. Click the Storage > Snapshots.
4. On the screen that appears, you’ll see the list of all VS snapshots.

To create a snapshot for VMware VS:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the server you want to back up.
3. Click the Storage > Snapshots.
4. Click the Create New Snapshot button.
5. Give your snapshot a name.
6. Click Create Snapshot button.

To delete a VS snapshot, click the Actions button next to the required snapshot, then click Delete.

8.4.13  VMware Virtual Server Statistics
For your convenience, the system tracks VS performance and generates statistics on:

- VS CPU Utilization
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- VS Billing statistics
- Interface Usage
- Disk IOPS

8.4.13.1 VMware Virtual Server CPU Utilization

OnApp tracks CPU usage for virtual servers and generates charts that help analyze VS performance. The charts show the total CPU usage for all the cores of this particular VS for a specified time period. The vertical axis shows the CPU usage percentage (CPU percentage is the core-independent quantity). The horizontal axis defines a time period.

To see CPU usage statistics:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Overview > CPU Usage.
4. On the screen that appears, the top chart shows CPU usage for the last 24 hours. The bottom chart shows usage for the last three months (if there is enough data). If there less data available, the chart will show utilization for the time available.
5. Tick the Show in My Timezone box to show bandwidth statistics according to your profile's time zone settings.
6. To zoom into a time period, click and drag in a chart. Click the Reset Zoom button to zoom out again.
7. You can filter the statistics by date and time - select the time period from the drop-down menu and click the Apply button.

To see what percentage of compute resource CPU resource a VS takes, go to your Control Panel > Cloud > Virtual Servers menu and click the label of the VS you're interested in. On the screen that appears, the CPU(s)/Shares parameter displays the amount of CPU resource given to this VS.

8.4.13.2 VMware Virtual Server Billing Statistics

OnApp has a record of all the charges applied to your VSs for the last three month period. If a virtual server was created less than three months ago, statistics are recorded for the VS's existence to date. You can view all statistics available, or those for a shorter period by setting a Start and End time.

To view billing statistics for a virtual server:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Overview > Billing Statistics tab.
4. You can filter the statistics by date and time - select the time period from the drop-down menu and click the Apply button. By default the statistics are generated for the last three months or the actual VS existence period.
5. Tick the **Show in my Timezone** box to show bandwidth statistics according to your profile's timezone settings.

6. On the page that appears:

- **Date** – particular date and time for the generated statistics
- **Users** – the virtual server owner. Click the owner name to see the User Profile (user details)
- **Virtual Servers** – the virtual server name with the total due for VS resources (CPU priority, CPUs, memory and template resources) for the point of time specified in the Date column.
- **Network Interfaces Usage** – the total due for the network interfaces used by this VS for the point of time specified in the Date column. Click the network interface name to see its details.
- **Disks Usage** – the list of disks assigned to this VS with the total due for the disk space resources (disk size, data read/written, reads/writes completed) for the point of time specified in the Date column. Click the disk name to see its details.
- **Costs** – the total due for the Virtual servers, Network Interfaces and Disks resources at the point of time specified in the Date column.

Scroll down to see Total Amount (the total due for the whole billing statistics period).

8.4.13.3 VMware Virtual Server Network Interface Statistics

OnApp tracks network usage for virtual servers and generates charts that help analyze network performance. To see network utilization statistics for a virtual server:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you're interested in.
3. Click the **Networking** > **Network Interfaces** tab.
4. Click the **Statistics** (chart) icon next to the network you're interested in.
5. On the screen that appears, the top chart shows bandwidth usage for the last 24 hours. The bottom chart shows usage for the last three months.
6. To zoom into a time period, click and drag in a chart. Click the **Reset zoom** button to zoom out again.
7. You can filter the statistics by date and time - select the time period from the drop-down menu and click the **Apply** button.

8.4.13.4 VMware Virtual Server Disk IOPS

The system tracks IOPS (Input/Output Operations per Second) for virtual servers and generates charts that help analyze VS disk performance. The data presented in the chart are for the periods during which the statistics was gathered, typically 3 minutes. To see IOPS for a virtual server:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the virtual server you're interested in.
3. Click the **Storage** > **Disks** tab.
4. There are four charts on the screen that appears:
   - IOPS for the last hour
   - IOPS for the last 24 hours
   - Data written/read for the last 24 hours
   - Data written/read for the last hour
5. To zoom into a time period, click and drag in a chart. Click the **Reset zoom** button to zoom out again.
6. You can filter the statistics by date and time - select the time period from the drop-down menu and click the **Apply** button.

The OnApp API allows you to limit the Hourly IOPS and Hourly data by setting the limit=N parameter, where the N variable is the number of hours for which the charts will display the info.

---

### 8.4.14 Manage VMware Virtual Server Recipes

**SSH connection is not required for running recipes on VMware virtual servers.**

To manage virtual server recipes:

1. Go to your Control Panel > **Cloud** > **Virtual Servers** menu.
2. Click the label of the server you're interested in.
3. Click the **Overview** tab, then choose **Recipes**.
4. The screen that follows shows details of all the recipes in the cloud:

   - The left pane shows the list of available recipes organized into recipe groups.
   - The right pane displays the list of events to which the recipes can be assigned. Click the arrow button next to the event to expand the list of recipes assigned to it.

**Assign recipe**

Use drag and drop feature to assign recipe to assign a recipe to a desired event.

You can assign virtual server recipes to the following events:

- **VM provisioning** - run the recipe during VM provisioning
- **VM network rebuild** - run the recipe when rebuilding a network
- **VM disk added** - run the recipe when adding a disk
- **VM network interface added** - run the recipe when adding a network interface
- **VM disk resized** - run the recipe when resizing a VM disk
- **VM resize** - run the recipe when resizing a VM

**To use drag and drop:**

1. Click the arrow button in front of the required event to unfold it.
2. Select the required recipe in the right pane and hold it down with the left mouse button.
3. Drag the recipe up to the left pane and release the mouse button to drop the recipe and add it to the required event.

**Remove recipe**

To remove recipe:

1. Click the arrow button in front of the required event to view the list of recipes assigned to it.
2. Click the **Delete** button next to the recipe you want to remove.
8.4.15 Manage VMware Virtual Server Custom Variables

You can define custom variables for particular virtual servers. Each custom variable is a name-value set that can be used during the virtual server recipe implementation. Custom variables are set on a per server basis. You can create custom variables during the virtual server creation or via the virtual server Overview menu.

To create a new custom variable:
1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. You'll see a list of all virtual servers in your cloud. Click the name of a virtual server for which you want to create a variable.
3. On the virtual server details screen, click the Overview tab, then choose Recipes Variables.
4. On the screen that appears, click the "+" button.
5. Specify the recipe name and its value.
6. Move the Enabled slider to the right to allow use of this recipe.
7. Click Save.

To edit a custom variable, click the Edit icon next to the required variable and change its details.

To delete a custom variable, click the Delete icon next to the variable you want to remove. You will be asked to confirm the deletion.

It is possible to set custom variables for image templates, as well as for virtual servers. Virtual server custom variables will always overlay template custom variables.

8.5 Smart Servers

Smart servers are dedicated entities based on KVM CloudBoot compute resources with passthrough enabled. Smart servers are created and managed exactly the same as virtual servers, the only difference is that only one smart server can be created per compute resource. Using a smart server feature, you can create and manage servers on smart appliances with passthrough enabled. You can set the minimum specifications for the smart servers (minimum size, resource price, etc) in the same way as for virtual servers.

Smart servers can be organized into zones to create different tiers of service - for example, by setting up different zones for smart appliances, with limits and prices specified per zone. Smart compute zones can also be used to create private clouds for specific users.

Smart servers required IOMMU support:
- Intel-based Servers => Vt-d
- AMD-based servers => AMD-Vi

Smart servers are based on templates and are deployed on compute resources. Compute resources give them access to CPU, disk and network resources. OnApp Cloud gives you high-end cloud management features including:

<table>
<thead>
<tr>
<th>Smart Server Options</th>
<th>Power Options</th>
<th>Administrative Options</th>
<th>Networks</th>
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<tbody>
<tr>
<td>Edit</td>
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<td>Reset Root</td>
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<td>Create View</td>
<td>View</td>
<td>CPU</td>
<td>Recipes</td>
<td></td>
</tr>
</tbody>
</table>
The following options are not available for smart servers:

- hot migration
- segregation
- VIP status
- firewall rules

Also, VLANs are not configured automatically on smart servers. You need to configure them manually in accordance with your OS and hardware settings.

- smart servers support LVM and integrated storage types.
- the Passthrough to Guest must be enabled for one of the smart server's network interfaces.
- all conventional PCI devices behind a PCIe-to PCI/PCI-X bridge or conventional PCI bridge can only be collectively assigned to the same guest. PCIe devices do not have this restriction.
- limits and prices are specified individually for each smart appliance zone assigned to the bucket.
has a NIC device that features multiple ports, make sure the appliance NIC can perform a FLR reset:

1. Log in as root to a compute resource where it is deployed
2. Run the following command:

```bash
# lspci -vv|egrep "Ethernet|FLR" --color=always
```

If it returns the FLReset- you need to install another NIC if possible. If not - the smart server cannot be deployed on this compute resource.

### 8.5.1 View Smart Servers

To view the list of smart servers deployed in the cloud:

1. Go to your Control Panel > Cloud > Smart Servers menu to see an overview of all smart servers in the cloud with their details:
   - OS
   - Label,
   - IP addresses
   - Disk size
   - RAM
   - CPU cores
   - CPU priority
   - Backups
   - Power status

2. Click the **Actions** button next to the server for the quick access to the list of available actions (the list of actions displayed depends on the server status).

3. To change the smart server power status, click the required status icon.

4. To **view a particular smart server details**, click the label of a required server.

5. To add a new smart server, press "*" or click the **Add New Smart Server** button.

### 8.5.2 View Smart Server Details

To view details of a specific smart server:

1. Go to your Control Panel > Cloud > Smart Servers menu.

2. Click the label of the smart server you're interested in.

3. The screen that appears loads the Smart server properties, notes, activity log and tools for managing your smart server.

#### 8.5.2.1 Smart Server Properties

Smart server properties page gives general overview of the smart server details:

- Template this smart server is built on
- Power status & On/Off/Reboot buttons.
Clicking the OFF button performs graceful shutdown and then powers off the virtual server after the timeout set in Configuration settings.

- Hostname
- Smart compute resource
- Login credentials
- Owner
- Estimated Price per hour. This sum does not take into consideration the free limits for resources set in the bucket. Therefore, the final price for the server might differ from the sum indicated here.
- Memory
- CPU(s)
- Disk Size
- Disk backups
- Network Speed
- IP Addresses
- AutoBackups
- Notes
- Activity log

Autoscaling and VIP status options are not available for smart servers.

8.5.2.2 Notes
The Notes section lists brief comments or reminders for a Smart server. You can add either Admin's or User's notes. The Admin's note will be available to cloud administrators. Click the Actions button in the Notes section of the page to add admin's or user's note.

8.5.2.3 Smart Server Management
- Click the Tools button to expand the Tools menu with the Smart Server management options.
- Use the top menu to manage your smart servers’ networking/storage options.

8.5.3 Create Smart Server

You need to add and configure a smart CloudBoot compute resource before you can create a smart server. See the Create CloudBoot Compute resource section for details.

Starting with the OnApp Cloud v3.1 it is possible to deploy Windows smart servers without running sysprep. To do so, you need to disable the Run Sysprep option for the compute zone the smart server will be built on. See create compute zone section for details. When provisioning smart server with simple deploy option, make sure that the template you use has all the necessary drivers inside it, otherwise the smart server network settings will
To create a smart server:

1. Go to your Control Panel > **Cloud** > **Smart Servers** menu.
2. On the screen that appears, press "+" button or click the **Add New Smart Server** button underneath the list of servers on the screen.
3. Complete the smart server creation form:

   **Step 1 of 5. Templates**

   - Choose a template to build a smart server on, then click **Next**. You can use any KVM templates for smart server creation.

   Before creating a Windows-based smart server, make sure that the appropriate drivers were added to the /data folder on CP.

   **Step 2 of 5. Properties**

   - **Label** - choose a label for the Smart Server.
   - **Hostname** - choose a hostname for the Smart Server. The hostname may consist of letters [A-Z a-z], digits [0-9] and dash [-].
   - **Domain** - specify the domain for this VS. The default value is `localdomain`. This parameter is not applicable to Windows virtual servers.

     For example: `test.onapp.com` - specify 'test' as hostname, 'onapp.com' as domain. If you leave the domain field blank, the default value 'localdomain' will be used and you will get the following - `test.onapp.com.localdomain`.

   - **Time zone** - set the time zone set for the smart server. This parameter is applicable only to Windows smart servers.

     Currently, the time zone is set at the Compute resource side only. Therefore, users need to set the target time zone inside a Windows smart server manually. Setting correct time zone at the Compute resource side helps to keep correct time inside a smart server after starting it if time synchronization is not completed for some reason.

   - **Password** - Give your smart server a secure password. If you leave password field blank, it will be generated automatically.
   - **Password confirmation** - repeat the password to confirm it.
- Encrypt password - move the Encrypt Password slider to the right, to encrypt your password, then enter an encryption key in the field that appears.
- Click Next.

**Step 3 of 5. Resources**

Set the resources needed for this smart server:

- **Compute zone** - choose a smart compute zone to build the smart server on.
- **Compute resource** - choose a specific smart compute resource to reside the smart server on. Please note: you can only reside your smart server on cloud booted KVM compute resources.
- **RAM** - set the amount of virtual server's RAM.
- **CPU Cores** - set the amount of virtual server's CPU cores.
- The following options are available for smart servers based on KVM compute resources only, providing the Enable CPU topology permission is switched on for the user.
  
  i. **Use CPU Topology** - move the slider to the right, to set the following parameters:
    - **CPU Sockets** - set the amount of sockets per core.
    - **CPU Threads** - set the amount of threads per core.

CPU topology (CPU sockets and CPU threads) is the Labs feature preview. Pay attention that setting CPU sockets and CPU threads are at your own risk only!

You may face the following problems when setting CPU topology:

1. Currently you cannot set CPU sockets and threads parameters for existing smart servers.
2. After setting, the new parameters won't be shown at the smart servers details screen.
3. Some Linux VSs fail to boot up.

- **Data Store Zone** - choose a data store zone for the smart server’s primary disk.
- **Primary disk size** - set the primary disk size.
- **Data Store Zone** - choose a data store zone for this server’s swap disk.
- **Swap disk size** - set the swap disk size.
- **Disable** - select the checkbox to disable a swap disk.
- **Network Zone** - choose a network zone from the drop-down box.
Step 4 of 5. Recipes

a. Choose a recipe you want to assign to this smart server by dragging the required recipe from the Available recipes pane to the Assigned for provisioning pane.

b. To add a custom variable, click the "+" button next to the Custom recipe variables title bar, then specify the variable details:
   - Specify the recipe name and its value.
   - Move the Enabled slider to the right to allow the use of this variable.

c. Click Next.

Step 5. Confirmation

- Move the Enable Automated Backup slider to the right if you want this server to be backed up automatically (according to the backup settings configured in the Settings/Auto-backup Presets menu).
- Move the Build Smart Server slider to the right if you want the system to automatically build the server. If you leave this box blank, you will have to build your server manually after it is created.
- Move the Boot Smart Server slider to the right if you want the server to be started up automatically.
- Move the Enable Autoscale slider to the right to set autoscaling for this smart server.

- Until the autoscaling rules are configured the autoscaling itself will not start working.
- If the Enable Autoscale slider is grayed out that means that you have reached the autoscaling limit in the bucket (or the max is set as 0).

At the Confirmation step you can find the configuration summary of the smart server, which will be created. You can view template's name, RAM size, number of networks, primary disk and swap disk size, number of cores.

4. Click Submit button. The smart server will be added to the system. You can view it under the Smart Servers menu.

8.5.4 Edit Smart Server

To edit smart compute resource settings:
1. Go to your Control Panel > Cloud > Smart Servers menu.

2. Click the label of the server you want to edit.

3. Click the Tools button and select the Edit smart server link. You can edit the label, pricing, CPU and RAM resources for all smart servers. You can also edit the time zone for Windows smart servers.

   After you edit the server's time zone, you need to stop and then start up the smart server.

   Currently, the time zone is set at the Compute resource side only. Therefore, users need to set the target time zone inside a Windows smart server manually. Setting correct time zone at the Compute resource side helps to keep correct time inside a smart server after starting it if time synchronization is not completed for some reason.

   Depending on the OS it is built on, some smart servers can have their CPU and RAM resized without needing to be powered off ("resize without reboot").

4. Click the Save button to save your changes.

   If the smart server template allows resize without reboot, the resize should be completed automatically: you will be returned to the server details screen and see a message indicating the resize was successful. If the template does not allow this, you will be asked to confirm that the smart server will need rebooting so that the resize can take place.

8.5.5 Delete Smart Server

Shut down the smart server before destroying it. If you are deleting a smart server that is running, the server will be deleted after the time set in Timeout Before Shutting Down configuration parameter.

To remove the smart server from the cloud:

1. Go to your Control Panel > Cloud > Smart Servers menu.

2. On the screen that appears, you’ll see the list of all servers in the cloud. Click the label of the smart server you want to delete.

3. On the server screen, click the Tools button, then select Delete Smart Server.

4. Confirm the deletion.

8.5.6 Rebuild/Build Smart Server Manually

To build/rebuild virtual server build/rebuild virtual server must be enabled. This is a new permission which manages build/rebuild functionality independently from update virtual server permission which used to regulate the build/rebuild options in the previous versions.

If you haven't checked the Build Smart Server option during the smart server creation process, you will have to do this manually after the SS has been created. Building a smart server is the process of allocating physical resources to that smart server.

To build a smart server manually or rebuild the server on the same (or another) template:
1. Go to your Control Panel > **Cloud** > **Smart Servers** menu.
2. Click the label of the server you're interested in.
3. On the screen that appears, click the **Tools** button and then click **Rebuild Smart Server**.
4. On the screen that pops up, use the drop-down menu to choose a template with which to build the server.
5. Move the **Start VS after rebuild** slider to the right if you want to have your server started automatically after it is built.
6. Click the **Rebuild Virtual Server** button to finish.

```
After you rebuild your template all data will be lost!
```

### 8.5.7 Migrate Smart Server

To migrate Smart Servers between different compute resources the network interface configuration of those compute resources should be identical.

OnApp allows cold migration of smart servers between hosts that share common data stores (or data store zones). Cold migration means moving smart servers that are shut down.

To migrate a smart server:

1. Go to your Control Panel > **Cloud** > **Smart Servers** menu.
2. Shut down the smart server you want to migrate.
3. Click the **Tools** button and press the **Migrate Smart Server** link.
4. In the window that appears, choose the target smart server from the drop-down menu.
5. Click the **Start Migration** button.

OnApp administrators can control user access over smart server migration. Using OnApp permissions, you can allow/disallow users to perform migration of all smart servers, or their own servers only. This is handled in the Control Panel's **Roles** menu.

### 8.5.8 Autoscale Smart Server

Smart server autoscaling allows you to change the RAM, CPU and disk size settings of a smart server automatically. Smart server resources scaling is based on rules you specify. For example, you can set up a rule that will add 1000MB of memory to a smart server if RAM usage has been above 90% for the last 10 minutes - but add no more than 5000MB in total in 24 hours. You can set autoscaling down settings alongside with autoscaling up.

- For **Linux-based smart servers only**.
- If the smart server is based on a template that allows resizing without reboot - see the **Edit smart server** section – then smart server RAM and CPU will be increased without rebooting the server. Disk space autoscaling requires a smart server reboot.
- If you autoscale a smart server's memory to a value greater than current smart server RAM x 16 (which is a max_memory parameter in a configuration file and database), the smart server will be rebooted.
anyway, regardless of the template it is built on.

- Make sure a VS can be reached via SSH. Otherwise, the autoscaling client installation will fail.

- Starting with version 4.2, OnApp uses Zabbix for autoscaling. Monitis will be used for autoscaling of servers built using OnApp versions previous to 4.2 until you switch autoscaling off for such server(s). If you decide to switch autoscaling back on, autoscaling will be implemented using Zabbix. Zabbix also will be used for autoscaling of newly created VSs.

To configure autoscaling settings:

1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the appropriate smart server.
3. On the page that follows, click the Overview tab, and then click Autoscaling.
4. Press the required tab to set the autoscaling options for: Memory Usage, Disk Usage or CPU Usage.
5. Add autoscaling rules as explained below:

   Set autoscale up options:
   - If RAM usage is above \( X \)% for a specific time period, add \( Y \) MB – but no more than \( Z \) MB in a 24 hour period.
   - If CPU usage is above \( X \)% for a specific time period, add \( Y \)% - but no more than \( Z \)% in a 24 hour period.
   - If disk usage is above \( X \)% for a specific time period, add \( Y \) GB - but no more than \( Z \) GB in a 24 hour period.
   - Move the Allow decreasing slider to the right to enable autoscaling down

   Set autoscale down options:
   - If RAM usage is below \( X \)% for a specific time period, remove \( Y \) MB – but no more than \( Z \) MB in a 24 hour period.
   - If CPU usage is below \( X \)% for a specific time period, remove \( Y \)% - but no more than \( Z \)% in a 24 hour period.
   - If disk usage is below \( X \)% for a specific time period, remove \( Y \) GB - but no more than \( Z \) GB in a 24 hour period.
   - Move the Allow decreasing slider to the right to enable autoscaling down

6. Click Apply.

To delete an autoscaling rule:

1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the appropriate smart server.
3. On the page that follows, click the Overview tab, and then click Autoscaling.
4. Click Delete. This will delete all autoscaling rules.

Clicking the Apply button does not activate autoscaling if the Autoscale
slider at VS overview page is disabled. You can configure autoscaling rules, press the Apply button, these rules will be saved and will start working only after the Autoscale slider at VS overview page is enabled. Also you can disable the Autoscale slider, autoscaling will stop working, but the configuration of rules will be saved in case you will want to activate them in future.

8.5.9 Smart Server Power Options
To manage a smart server power options:
1. Go to your Control Panel > Cloud > Smart Server menu.
2. Click the label of the smart server in question.
3. Click the Tools button on the Smart server's screen to expand the Tools menu.
4. The Tools menu enables you to perform the following power actions on smart servers (the exact list shown depends on the smart server status):

- Reboot Smart Server - powers off and then restarts the smart server.
- Reboot in Recovery powers off and then restarts the Smart Server Recovery mode with a temporary login ("root") and password ("recovery") for servers where password encryption is enabled. For servers with password encryption disabled, the root password will be used to reboot in recovery.

Windows smart servers boot from the Linux-based recovery template in a recovery mode. You need to log in as admin via SSH or VNC console, then mount a Windows system disk manually.

PLEASE NOTE: You cannot work with the "whole" disk (like mount -t ntfs-3g /dev/sdb1) while mounting and checking block devices inside the recovery image, as Windows disk is splitted into partitions.

- Suspend Smart Server - stops a smart server, changes its status to suspended and disables all the other actions on SS, unless unsuspended.
- Shut Down Smart Server – pops up a dialog box, where you can either Shut Down SS (terminates the SS gracefully), or Power Off SS (terminates the SS forcefully).
- Startup Smart Server - queues a start-up action for a SS that's currently powered off.
- Startup on Recovery - starts the SS in recovery mode with a temporary login ("root") and password ("recovery").
- Boot from ISO - boots the VS from an ISO. You can boot virtual servers from your own ISOS or the ISOS that are uploaded and made publicly available by other users. If you boot a VS from an ISO with the RAM requirement larger than the VS's RAM, the transaction will fail. Make sure that you have enabled the Any power action on own virtual servers and Allow own virtual servers to boot from ISO permissions for the user to have access to this feature.
As soon as you boot a VS from the ISO, OnApp cannot control any components (backups, networks, disks) !!! The only available actions will be start and stop a VS. Be aware, that all the contents of the disk will be deleted.

8.5.10 Smart Server Administrative Options

To manage a smart server power options:
1. Go to your Control Panel > Cloud > Smart Server menu.
2. Click the label of the smart server in question.
3. Click the Tools button on the smart server’s screen to expand the Tools menu.
4. The Tools menu enables you to perform the following administrative actions on smart servers:
   - Reset Root Password - resets the root password for this SS (the password is displayed in SS Information).
   - Change Owner - pops up a dialogue box with a drop-down of all users on the system, enabling you to pass ownership of the SS to the user selected from the list.
   - Set SSH keys – assigns SSH keys of the admin and a SS owner to the SS. If a SS owner does not have any SSH keys, the system will only assign admin keys.

8.5.11 Smart Server Transactions and Logs

The system records a detailed log of all the transactions happening to your smart servers. The list of transactions logged by the system includes:
- Provision smart server
- Startup smart server
- Stop smart server
- Resize smart server without reboot
- Configure Operating System
- Build disk
- Resize disk
- Format disk
- Destroy disk
- Take backup
- Convert backup
- Restore backup
- Destroy backups
- Destroy virtual server
- Destroy template
- Download template
8.5.12 Smart Server Integrated Console

OnApp provides an integrated VNC console that gives users direct access to their smart servers through the Control Panel UI. The noVNC console is provided for smart servers that are built on KVM CentOS 7 based on WebSockets. The console connects a user browser to a VNC port or VNC WebSocket port available via a compute resource for the guest console.

To access the smart server VNC console via the Control Panel:
1. Go to the Cloud > Smart Servers menu.
2. Click a label of a destination smart server.
3. Click the Console button.

For the HTML5 console, click the Re-connect button if the connection is lost. The re-connection to the console runs as follows:

- If the console runs as expected, clicking the Re-connect button causes disconnection and the console is re-connected automatically after 1.5 seconds.
- If the console gets stuck, clicking the Re-connect button runs your request once again and re-connects the console without reloading.
- If the console gets disconnected with a status code and an error message, the console is re-connected automatically after 1.5 seconds.

8.5.13 Smart Server Networks

The Networking menu enables you to manage network interfaces, allocate IP addresses and set firewall rules for smart servers.

8.5.13.1 Configure Smart Server Network Interfaces

The Networking > Network Interfaces menu shows the virtual network interfaces allocated to the smart server. Network interfaces join the physical network to the smart server. When you create a smart server, a network interface is added automatically. This network interface will be assigned to the existing physical network using a spare IP (IPv4) and will be set primary by default.

OnApp supports IPv4 and IPv6. Since not every application supports IPv6, at least one IPv4 address must be allocated to a smart server primary network interface.

To see the list of all network interfaces allocated to the smart server:
1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the smart server you're interested in.
3. Click the Networking tab, then click Network Interfaces.
4. On the page that follows you will see the following fields:

- Interface – optional label of the network interface.
- **Network join** – name of the network and a compute resource or compute zone this network is joined to.
- **Port speed** – the speed set to the interface.
- **Primary interface** – indication whether the interface is primary or not.

Here you can also edit and delete network interfaces (using icon controls) and add a new network interface using the button at the bottom of the screen.

To add a network interface:
1. Go to your Control Panel > **Cloud** > **Smart Servers** menu.
2. Click the label of the smart server you're interested in.
3. Click the **Networking** tab, then click **Network Interfaces**.
4. Click the **Add New Network Interface** button at the bottom of the screen.
5. On the screen that appears, input values for the following parameters:
   - **Label** – a human-friendly name for the new interface.
   - **Physical Network** – choose a network join from the drop-down menu, which lists network joins assigned to the compute resource/compute zone on which the smart server runs).
   - **Port speed** – set port speed in Mbps, or make it unlimited.
6. Click the **Submit** button.

To edit network interface label, port speed or set it as primary (if none is marked as primary), click the **Edit** icon next to the appropriate network interface. After editing the port speed, the smart server should be power cycled for the change to take effect.

To delete a network interface, click the **Delete** icon next to the interface you want to delete.

---

**8.5.13.2 Rebuild Smart Server Network**

To rebuild a network join, added to the smart server (required after allocating new IP addresses):
1. Go to your Control Panel > **Cloud** > **Smart Servers** menu.
2. Click the label of the required smart server.
3. On the screen that appears, click the **Tools** button, then click **Rebuild Network**.
4. In the pop-up window, move the **Force Reboot** slider to the right, then select the smart server shutdown type:
   - Power OFF smart server
   - Shutdown smart server
   - Gracefully shutdown smart server

   Smart servers are rebooted by default after rebuilding the network.
5. Move the **Required Startup** slider to the right to start up the smart server automatically after the network is rebuilt.
6. Click the **Rebuild Network** button.

### 8.5.13.3 Allocate/Remove Smart Server IP Addresses

In the **Networking > IP Addresses** tab you can find the list of assigned IP addresses, allocate new IP addresses and rebuild a network.

To allocate a new IP Address to the smart server:

1. Go to your Control Panel > **Cloud > Smart Servers** menu.
2. Click the label of the server you're interested in.
3. Click the **Networking** tab, then click **IP Addresses**.
4. Click the **Allocate New IP Address** button.
5. Select a network interface from the drop-down menu (only the network interfaces you added to the smart server will be available)
6. Select an IP address from the IP Pool associated with the network interface.
7. Click the **Add IP Address** button.
8. Click the **Rebuild Network** button to rebuild the network.

You must rebuild the network after making changes to IP address allocations.

To remove an IP address from a smart server:

1. Go to your Control Panel > **Cloud > Smart Servers** menu.
2. Click the label of the server you're interested in.
3. Click the **Networking > IP Addresses** tab.
4. Click the **Delete** icon next to the IP address you want to delete.
5. In the pop up window that appears:
   - Choose **Delete and rebuild the network** option if you want to reboot a smart server and rebuild the network immediately after deleting the IP address. After choosing the **Delete and rebuild the network** option you will be redirected to the smart server **Overview** page.
   - Choose **Delete without rebuilding the network** option if you don't want to reboot a smart server. In this case to apply the changes, you will have to the reboot the smart server additionally.

You can't delete an IP address that is in use.

### 8.5.13.4 Display Network Speed for Network Interfaces on Smart Server Page

The main **Smart Servers** screen displays the network speed of each smart server primary network interface. To see the speed of all interfaces assigned to a smart server:

1. Go to your Control Panel > **Cloud > Smart Servers** menu.
2. Click the label of the smart server you are interested in.
3. Click the **Networking > Network Interfaces** tab.
4. On the screen that appears, the **Port Speed** column shows the network speed of the network interface.
8.5.14 Smart Server Disks

Smart server storage is provided by disks. A disk is a partition of a data store that is allocated to a specific smart server. Disks can be assigned as standard or swap disks (there are no swap disks for Windows based templates). They can also be set as primary (that is, the disk from which an OS will boot).

It is possible to use incremental backups. For details, see Smart Server Backups section of this guide.

Managing disks for the entire cloud is handled through the Control Panel's Settings menu. Disks for individual smart servers are managed through the Control Panel > Cloud > Smart Servers menu, where you can:

- See the list of disks allocated to this Smart Server
- Add a new disk
- Resize a disk
- Migrate a disk
- Set backup schedules
- Delete a disk
- Back up disks
- View disk backup schedules

PLEASE NOTE: Creating multiple partitions on one disk is forbidden for Windows-based virtual servers.

8.5.14.1 Add Disks to Smart Server

Adding a disk to a smart server will require that server to be rebooted. If a smart server is running when you try to add a new disk to it, you'll be asked to confirm the reboot. To add a disk to a smart server:

1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click a smart server label to open its details screen.
3. Click the Storage tab > Disks.
4. Click the "+" button or the Create Disk button.
5. Fill in the details:
   - Specify disk's label
   - Choose the data store to create a disk on from the drop-down menu.
   - Set the desired disk size.

   The disk size should not exceed 2 TB when a new disk is added. You can later resize the disk if you need it to be larger than 2 TB.

   - Specify if this disk is swap space, and requires formatting.
   - Specify whether the disk should be added to Linux FSTAB, and its mount point. The maximum length of a Mount Point is 256 characters. Spaces are not allowed. No more than one slash is allowed. If the mount point is not specified the default mount point will be used:
To be able to take incremental backups for virtual server’s disk, you must mount this disk to FSTAB (either Linux or FreeBSD) and specify the proper mount point manually.

Swap disks are not backed up.

6. Click the Add Disk button to finish.

When you add a new disk to a smart compute resource it will automatically become available to that compute resource.

8.5.14.2 Edit Smart Server Disks

You can easily resize disks when needed. The resize will fail if your current usage is greater than the new size you request. Note, that any changes on disk size will lead to reboot of your smart server.

To change disk size:

1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Make sure your smart server is powered off, then click its label to open its details screen.
3. Click the Storage > Disks.
4. Click the Actions button next to the disk you want to change, then click the Edit link.
5. Enter a new disk label and size in GB in the fields provided.
6. Click the Save Disk button.

8.5.14.3 Migrate Smart Server Disks

You can migrate disks of your smart servers to other data stores, which are allocated to the same smart compute resource or smart compute zone. Disk migration requires reboot of the smart server (despite the template it is based on).

To migrate a disk:

1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Make sure your smart server is powered off, then click its label to open its details screen.
3. Click the Storage tab > Disks.
4. Click the Actions button next to the disk you want to move to another data store, then click the Migrate button.
5. On the screen that appears, select a target data store from a drop-down box.
6. Click Start Migrate.
You can only migrate disks to data stores in data store zones assigned to your bucket.

You cannot migrate a disk to a data store with less capacity than the disk size.

If you move a 850GB disk between aggregates with 10GB actual usage, the 'dd' image of the local volume manager will take 850GB space, because the entire local volume manager is copied, including zero 'd space which may not be able to be recovered.

8.5.14.4 Delete Smart Server Disks
To delete a disk:
1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Make sure your smart server is powered off, then click its label to open its details screen.
3. Click the Storage > Disks tab.
4. Click the Actions button next to the disk you want to delete, then click Delete.

8.5.15 Smart Server Backups
Backups are used for copying and archiving target data (target is either a disk or a smart server as a single whole of all disks used).

OnApp supports two backup types: normal and incremental:

- **Normal backup** - simple method of taking backups by making full copy of target data and storing it in an archive.

- **Incremental** - advanced method of taking backups. During the incremental backup, only the changes made after the last backup are archived instead of backing up the whole target. You must have dedicated backup servers configured in your cloud to be able to utilize the incremental backups functionality. Incremental backups are enabled via **Admin > Settings > Configuration > Backups/Templates** menu.

It is not possible to take incremental backups if you are using location group functionality without a backup server added to the group - the following error message will appear:

"Backup cannot be made at this time: This disk cannot be backed up, check Location Group settings."

This issue will be fixed in next releases. As a workaround, add an empty backup server zone to your location group.

Each backup type can be taken in two ways:

- **Manually** - the user logs into OnApp CP and clicks the “Take backup” button.
- Automatically - the user enables automatic backup option (daily, weekly, monthly, yearly). To enable auto-backups for virtual servers that support incremental backups which used auto-backups option before the upgrade, re-enable automatic backups by switching them off and on again.

If you are using incremental backups option, you should either enable dedicated backup servers in your cloud or share the backups and templates folders (paths) between your compute resources. SSH file transfer option will be skipped for virtual servers using incremental backups. Existing full backups will be still accessible via Backups > Images menu.

8.5.15.1 How do incremental backups work?
For example, we have a disk with three files:
- File1 - 4Gb
- File2 - 2Gb
- File3 - 3Gb

The first incremental backup will be 9 GB (sum of all files). If you decide to take another incremental backup soon thereafter, the backup size will be equal to 0, as the files have not been changed since the first backup (if your backup has complicated directory structure, it could be more than 0, as file system could store some system data).

Then:
- If the user decides to delete File2, the target size will now be 7Gb. The subsequent incremental backup size will be 0, as new data has not been added.
- If the user adds File4 of 4 GB size, the subsequent incremental backup will equal 4 GB (the size of new data added).
- If the user increases File3 disk size to 6 GB, the subsequent incremental backup size will equal 6 GB, although the target is increased by 3 GB. This happens because the incremental system takes the update of the existing file as the deletion of the existing file and adding the new file with the same name (the first version of File3 has been deleted and the new one with 6GB size has been added).

Backups can be saved either to a compute resource or to a dedicated backup server. When saving a backup, the system calculates if user has enough physical/bucket resources to save a backup in the selected destination.

When saving a backup to a compute resource, the system does not check if compute resource has enough disk space to save a backup and only checks if user has enough bucket limits.

When saving a backup to a dedicated backup server, the system checks both disk space and bucket limits.

Free disk size on a target must be at least equal to the disk’s size for which the backup is taken (or to a size of all VS disk for incremental backup).

In some cases (for example, if a user has scheduled several disk backups simultaneously but there’s only free space/billing limits for the first one) the system may allow taking all the backups but will not be able to save them. This will result in a system error and over-billing.
<table>
<thead>
<tr>
<th></th>
<th>Normal backup</th>
<th>Incremental backup</th>
<th>Convert to template</th>
</tr>
</thead>
<tbody>
<tr>
<td>BaremetalServer</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>EdgeServer</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>StorageServer</td>
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<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>LoadBalancer</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>SmartServer</td>
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<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>KVM, XEN</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<td>snapshot</td>
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</tr>
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<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>*nix</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>CloudBoot / IS</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>SolidFire</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

8.5.15.3 View Smart Server Backups
To view the list of smart server's backups:
1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the required smart server.
3. Click the Backups tab, then select the appropriate backup type:
   - Images - full backups
   - Files - incremental backups
4. On the screen that appears, you'll see a list of smart server backups sorted by category.
5. Click the label of the required smart server backup to see the following tools - restore backup, delete backup, convert it to template and add note:

8.5.15.4 Take Smart Server Backup
To take an incremental backup:
1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the server you want to back up.
3. Click the Backups tab, then select Files. You'll see a list of the disks allocated to that smart server.
4. Click the **Actions** icon next to a disk you want to take a backup of, then click **Backup**. You’ll see a list of all the backups taken and pending for that disk, along with the tools to restore backups, delete them, and convert them to templates.

5. To take a backup, click the **Take a Backup** button at the end of the list.

---

**Backups in the OnApp Control Panel are associated with a particular user instead of being associated with a smart server. To view the list of user backups, refer to **View User Backups** section.**

---

**Template extraction is performed during server provisioning or taking a backup when using a particular template. To prevent template from being used in other transactions during extraction, template is locked during the extraction and unlocked on accomplishment. If other transaction tries to use the locked template, it will fail after 5 minutes of standby.**

**Transaction which locked template and failed, means that extracted template is broken.**

**Storing scheme:**

- template /onapp/templates/your_template.tgz
- extracted template /onapp/backups/templates/your_template
- locked template /onapp/backups/templates/your_template.lock

---

8.5.15.5 **Take Smart Server Disk Backup**

To back up a smart server:

1. Go to your Control Panel > **Cloud** > **Smart Servers** menu.

2. Click the label of the appliance you want to back up.

3. Click the **Storage tab** > **Disks**. You’ll see a list of the disks allocated to that smart server.

4. Click the **Actions** icon next to a disk you want to take a backup of, then click **Backup**. You’ll see a list of all the backups taken and pending for that disk, along with the tools to restore backups, delete them, and convert them to templates.

5. To take a backup, click the **Take a Backup** button at the end of the list.

---

**Backups in the OnApp Control Panel are associated with a particular user instead of being associated with a smart server. To view the list of user backups, refer to **View User Backups** section.**

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8.5.15.6 **Convert Smart Server Backup to Template**

To convert smart server backup to template:
1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the required smart server.
3. Click the Backups tab, then select the appropriate backup type:
   - **Images** - full backups
   - **Files** - incremental backups
4. On the screen that appears, click the Actions icon next to the backup and choose the Convert to Template (see Create custom templates).

8.5.15.7 Restore Smart Server Backup
To restore a backup:
1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the required smart server.
3. Click the Backups tab, then select the appropriate backup type:
   - **Images** - full backups
   - **Files** - incremental backups
4. On the screen that appears, click the Actions icon next to the backup you want to revert to and choose Restore.
   
   If the file system on the disk is corrupted, it won't be possible to restore the files from incremental backup. In that case, you can force a backup restore and rebuild a file system on a disk. To do this, move the Force Restore slider to the right.

5. Click the Restore Backup button.

8.5.15.8 Delete Smart Server Backup
To delete a backup:
1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the required smart server.
3. Click the Backups tab, then select the appropriate backup type:
   - **Images** - full backups
   - **Files** - incremental backups
4. On the screen that appears, click the Actions icon next to the backup you want to remove and choose Delete.

8.5.15.9 Edit Smart Server Backup Note
To edit smart server backup’s note:
1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the required smart server.
3. Click the Backups tab, then select the appropriate backup type:
   - **Images** - full backups
   - **Files** - incremental backups
4. On the screen that appears, click the Actions icon next to the required backup and choose Add Note. Make necessary changes and click Submit.
8.5.16 Smart Server Backup Schedules

Schedules screen lists smart servers’ scheduled backup. Depending on the backup type set in your cloud settings, schedules are created either per smart server or per disk. To view all backup schedules in the cloud, see Schedules Settings.

8.5.16.1 View Smart Server Backup Schedules
To view the list of backup schedules for a particular Smart Server:

8.5.16.1.1 If normal backup options is selected for the cloud:
1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the Smart Server you’re interested in.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.
5. On the screen that appears, you will see the list of backup schedules along with their details:
   - **Date** - time when the schedule was created
   - **Target** - server or disk for which the schedule was created (depending on the backup type)
   - **Action** - scheduled action
   - **Frequency** - how frequently the backup will take place according to the period set. For example, frequency of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years
   - **Rotation period** - number of backups after which the first backup will be deleted

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

   - **Next Start** - the date and the hour of the next backup
   - **User** - user who created the backup schedule
   - **Status** - schedule status

8.5.16.1.2 If incremental backup option is selected for the cloud
1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the Smart Server you're interested in.
3. Select Backups > Schedules tab, or click Auto-backups under the Options section to view incremental backups schedules only.
4. On the screen that appears, you will see the list of backup schedules along with their details:
   - **Date** - time when the schedule was created
   - **Target** - server or disk for which the schedule was created (depending on the backup type)
   - **Action** - scheduled action
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days

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8.5.16.2 Create Smart Server Backups Schedule

In addition to the system auto-backup presets, you can schedule backups of Smart Servers (VS disks) as required. For example, you can set up a schedule to back up your disks once a week.

The combination of Scheduled VS backups and Auto-backup Presets provides a great deal of flexibility in the way backups are handled for the cloud, and for individual VSs. Auto-backup Presets can be applied to all new VSs added to the cloud. Scheduled VS backups enable specific backups to be scheduled for individual VSs, outside of the auto-backup pattern.

Depending on your cloud settings, you can schedule either normal or incremental backup schedules:

- Adding normal backup schedule
- Adding incremental backup schedule

8.5.16.2.1 Adding a normal backup schedule

To add a normal backup schedule:

1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the Smart Server you want to schedule a backup for.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.
5. On the screen that follows, click the New Schedule button.
6. Specify schedule details:
   - Frequency - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - Period - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - Rotation period - number of backups after which the first backup will be deleted.

   Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

   - Start time - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).

7. Click the Save button to finish.

8.5.16.2.2 Adding an incremental backup schedule

1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the Smart Server you want to schedule a backup for.
3. Click the **Backups** tab, then choose **Schedules**, or click **Auto-backups** under the **Options** menu to view incremental backup schedules only.

4. Click the **New Schedule** button.

5. On the screen that appears, specify new schedule's details:
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - **Rotation period** - number of backups after which the first backup will be deleted.
   - **Start time** - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).

6. Click the **Save** button to finish.

### 8.5.16.3 Edit Smart Server Backup Schedule

#### 8.5.16.3.1 To edit a normal backup schedule:

1. Go to your Control Panel > **Cloud** > **Smart Servers** menu.
2. Click the label of the Smart Server you want to schedule a backup for.
3. Click the **Storage** tab, then select **Disks**.
4. On the screen that appears, click the **Actions** button next to the disk you want to back up, then select **Schedule for Backups**.
5. Click the **Edit** icon next to a schedule to change its details.
6. Specify schedule details:
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - **Rotation period** - number of backups after which the first backup will be deleted.

   Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

   - **Start time** - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).
   - **Enabled** - move the slider to enable or disable the schedule

   For a schedule with the **Failed** status, you can move the **Enabled** slider to the right to run the schedule once again.

7. Click the **Save** button to finish.

#### 8.5.16.3.2 To edit an incremental backup schedule:

1. Go to your Control Panel > **Cloud** > **Smart Servers** menu.
2. Click the label of the Smart Server you're interested in.

3. Select Backups > Schedules tab, or click Auto-backups under the Options menu to view incremental backup schedules only.

4. Click the Edit icon next to a schedule to change its details:
   - Frequency - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - Period - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - Rotation period - number of backups after which the first backup will be deleted. This parameter is for incremental backup schedules only.
   - Start time - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).
   - Enabled - move the slider to enable or disable the schedule

5. Click the Save button to save your changes.

8.5.16.4 Delete Smart Server Backup Schedule

8.5.16.4.1 To delete a normal backup schedule:
1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the Smart Server you're interested in.
3. Click the Storage tab, then select Disks.

4. On the screen that appears, click the Actions button next to the disk with a backup schedule, then select Schedule for Backups.

5. Click the Actions icon next to the schedule you want to remove, then choose Delete.

8.5.16.4.2 To delete an incremental backup schedule:
1. Go to your Control Panel > Cloud > Smart Servers menu.
2. Click the label of the Smart Server you're interested in.
3. Select Backups > Schedules tab, or click Auto-backups under the Options section to view incremental backups schedules only.

4. On the screen that appears, you will see the list of backup schedules.

5. Click the Actions icon next to the schedule you want to remove, then choose Delete.

8.5.17 Smart Server Recipes
To manage smart server recipes:
1. Go to your Control Panel > Cloud > Smart Servers menu.

2. Click the label of the server you’re interested in.

3. Click the Overview tab, then choose Recipes.

4. The screen that follows shows details of all the recipes in the cloud:

   - The left pane shows the list of available recipes organized into recipe groups.
The right pane displays the list of events to which the recipes can be assigned to. Click the arrow button next to event to expand the list of recipes assigned to it.

**Assign recipe**

Drag and drop recipe to assign it to a desired event.

You can assign virtual server recipes to the following events:

- **VS provisioning** - run the recipe during the virtual server provisioning
- **VS network rebuild** - run the recipe while rebuilding a network
- **VS disk added** - run the recipe while adding a disk to the virtual server
- **IP address allocated for VS** - run the recipe when adding an IP address to the VS network interface
- **IP address revoked from VS** - run the recipe when removing an IP address from the VS network interface
- **VS network interface added** - run the recipe while adding a network interface to the virtual server
- **VS network interface removed** - run the recipe while deleting a network interface from the virtual server
- **VS disk resized** - run the recipe while resizing a virtual server disk
- **VS resize** - run the recipe while resizing the virtual server
- **VS IP address add** - run the recipe while adding an IP address to the virtual server
- **VS IP address remove** - run the recipe while removing an IP address from the virtual server
- **VS start** - run the recipe while starting the virtual server
- **VS reboot** - run the recipe while rebooting the virtual server
- **VS hot migrate** - run the recipe during the hot migration of the virtual server
- **VS hot full migrate** - run the recipe during the hot migration of the virtual server with disk
- **VS failover** - run the recipe during the failover process

**To use drag and drop:**

1. Click the arrow button in front of the required event to unfold it.
2. Select the required recipe in the left pane and hold it down with the left mouse button.
3. Drag the recipe up to the right pane and release the mouse button to drop the recipe and add it to the required event.

**Remove recipe**

To remove recipe:

1. Click the arrow button in front of the required event to view the list of recipes assigned to it.
2. Click the Delete icon next to the recipe you want to remove.

### 8.5.18 Smart Server Recipe Custom Variables

You can define custom variables for particular smart servers. Each custom variable is a name-value set that can be used during the smart server recipe implementation. Custom variables are set on a per server basis. You can create custom variables during the smart server creation or via the smart server **Overview** menu.

**To create a new custom variable:**

1. Go to your Control Panel > **Cloud** > **Smart Servers** menu.
2. You'll see a list of all smart servers in your cloud. Click the name of a smart server for which you want to create a variable.

3. On the smart server details screen, click the Overview tab, then choose Recipes Variables.

4. On the screen that appears, click the "+" button.

5. Specify the recipe name and its value.

6. Move the Enabled slider to the right to allow the use of this recipe.

7. Click Save.

To edit a custom variable, click the Edit icon next to the required variable and change its details.

To delete a custom variable, click the Delete icon next to the variable you want to remove. You will be asked to confirm the deletion.

It is possible to set custom variables for image templates, as well as for smart servers. Note: smart server custom variables will always overlay template custom variables.

8.5.19 Smart Server Statistics

For your convenience, the system tracks smart server performance and generates statistics on:

- Smart Server CPU Utilization
- Smart server billing statistics
- Smart Server Disk IOPS Statistics

8.5.19.1 Smart Server Billing Statistics

OnApp has a record of all the charges applied to your smart servers for the last three month period. If a smart server was created less than three months ago, statistics are recorded for the smart server's existence to date. You can view all statistics available, or those for a shorter period by setting a Start and End time.

To view billing statistics for a smart server:

1. Go to your Control Panel > Cloud > Smart Servers menu.

2. Click the label of the smart server you're interested in.

3. Click the Overview > Billing Statistics tab.

4. You can filter the statistics by date and time - select the time period from the drop-down menu and click the Apply button. By default the statistics are generated for the last three months or the actual smart server existence period.

5. Tick the Show in my Timezone box to show bandwidth statistics according to your profile's timezone settings.

6. On the page that appears:
   - Date – particular date and time for the generated statistics
   - Users – the server owner. Click the owner name to see the User Profile (user details)
   - Virtual Servers – the server name with the total due for smart server resources (CPU priority, CPUs, memory and template resources) for the point of time specified in the Date column.
- **Disks Usage** – the list of disks assigned to this smart server with the total due for the disk space resources (disk size, data read/written, reads/writes completed) for the point of time specified in the Date column. Click the disk name to see its details.

- **Costs** – the total due for the smart server, Network Interfaces and Disks resources at the point of time specified in the Date column.

Scroll down to see Total Amount (the total due for the whole billing statistics period).

### 8.5.19.2 Smart Server CPU Utilization

OnApp tracks CPU usage for smart servers and generates charts that help analyze smart server performance. The charts show the total CPU usage for all the cores of this particular smart server for a specified time period.

The vertical axis shows the CPU usage percentage (CPU percentage is the core-independent quantity). The horizontal axis defines a time period.

To see CPU usage statistics:

1. Go to your Control Panel > **Cloud** > **Smart Servers** menu.
2. Click the label of the virtual server you're interested in.
3. Click the **Overview tab** > **CPU Usage**.
4. On the screen that appears, the top chart shows CPU usage for the last 24 hours. The bottom chart shows usage for the last three months (if there is enough data). If there less data available, the chart will show utilization for the time available.
5. Tick the **Show in My Timezone** box to show bandwidth statistics according to your profile's timezone settings.
6. To zoom into a time period, click and drag in a chart. Click the **Reset Zoom** button to zoom out again.
7. You can filter the statistics by date and time - select the time period from the drop-down menu and click the **Apply** button.

To see what percentage of compute resource CPU resource a smart server takes, go to your Control Panel's **Smart Servers** menu and click the label of the smart server you're interested in. On the screen that appears, the CPU(s)/Shares parameter displays the amount of CPU resource given to this smart server.

### 8.5.19.3 Smart Server Disk IOPS Statistics

The system tracks IOPS (Input/Output Operations per Second) for smart servers and generates charts that help analyze smart server disk performance. The data presented in the chart are for the periods during which the statistics was gathered, typically 3 minutes. To see IOPS for a smart server:
1. Go to your Control Panel > **Cloud** > **Smart Servers** menu.
2. Click the label of the server you're interested in.
3. Click the **Storage** > **Disks** tab.
4. Click the **Actions** button next to the required disk, and then choose **IOPS**.
5. There are four charts on the screen that appears:
   - IOPS for the last hour
   - IOPS for the last 24 hours
   - Data written/read (in Kb) for the last 24 hours
   - Data written/read (in Kb) for the last hour
6. To zoom into a time period, click and drag in a chart. Click the **Reset Zoom** button to zoom out again.
7. You can filter the statistics by date and time - select the time period from the drop-down menu and click the **Apply** button.

The OnApp API allows you to limit the Hourly IOPS and Hourly data by setting the limit=N parameter, where the N variable is the number of hours for which the charts will display the info.

### 8.6 Baremetal Servers

Baremetal compute resources are physical servers, reside directly on the hardware without the virtualization layer. Baremetal compute resources are hosted on dedicated baremetal compute resources, deployed for a single user. Utilization of baremetal servers allows to locate customer's servers on a single piece of hardware. Use of baremetal servers in the cloud makes hardware resource utilization more efficient.

The advantages of baremetal servers:
- full access to the entire server
- tight security

Baremetal servers are hosted on Xen CloudBoot compute resources, that can be then organized into zones to create different tiers of service - for example, by setting up different zones for baremetal servers, with limits and prices specified per zone. Baremetal compute zones can also be used to create private clouds for specific users. Limits and prices are specified individually for each baremetal compute zone assigned to the bucket.

You can enable recovery mode for baremetal servers. For details, see [Enable Recovery Mode for Baremetal Servers](#). For 3.2.0 version, see [Baremetal Server Recovery Mode Patch Guide](#).

- Autoscale, Segregate and VIP status options are not available for baremetal servers. Also, it's not possible to wipe disks, as OnApp cloud administrators do not have access to baremetal server disks.
- VLANs are not configured automatically on baremetal servers. You need
to configure them manually in accordance with your OS and hardware settings.

8.6.1 View the List of Baremetal Servers
To view the list of all baremetal servers deployed in the cloud:

1. Go to your Control Panel > Cloud > Baremetal servers menu to see an overview of all baremetal servers in the cloud with their details: OS, label, IP addresses, etc.
2. Click the Actions button next to the server for the quick access to the list of available actions (the list of actions displayed depends on the server status).
3. To view a particular baremetal server details, click the label of a required server.
4. To add new baremetal server, press "+" or click the Add New Baremetal Server button.

8.6.2 View Baremetal Server Details
To view details of a specific baremetal server:

1. Click the label of the server you're interested in.
2. On the screen that appears, you'll see the baremetal server properties and activity log:
   - FQDN (fully qualified domain name)
   - Baremetal compute resource group the server belongs to.
   - Login credentials
   - Owner
   - Estimated Price per hour. This sum does not take into consideration the free limits for resources set in the bucket. Therefore, the final price for the server might differ from the sum indicated here.
   - IP Addresses
   - Notes
   - Activity log
3. To removes all transactions related to pending backups from the log, click the Clean all pending tasks for this Baremetal Server button at the bottom of the screen.

8.6.3 Create Baremetal Server
You need to add and configure a baremetal CloudBoot compute resource before you can create a baremetal server. See the Create CloudBoot Compute resource section for details.

The management network should be disconnected during the bare metal server deployment.

To create a baremetal server:

1. Go to your Control Panel > Cloud > Baremetal Servers menu.
2. On the screen that appears, press "+" button or click the Add New Baremetal Server button underneath the list of servers on the screen.
3. Complete the baremetal server creation form:

**Step 1 of 4. Templates**

- Choose a template to build a baremetal server on, then click **Next**.

**Step 2 of 4. Properties**

- **Label** - the label of the virtual server.
- **Hostname** - the hostname of the virtual server. The hostname may consist of letters [A-Z a-z], digits [0-9] and dash [-]
- **Domain** - specify the domain for this VS. The default value is `localdomain`. This parameter is not applicable to Windows virtual servers.

For example:

```plaintext
test.onapp.com - specify 'test' as hostname, 'onapp.com' - as domain. If you leave the domain field blank, the default value 'localdomain' will be used and you will get the following -

test.onapp.com.localdomain.
```

- **Password** - a secure password for the Baremetal Server. If you leave password field blank, it will be generated automatically.
- **Password confirmation** - repeat the password to confirm it.
- **Encrypt password** - move the Encrypt Password slider to the right, to encrypt your password, then enter an encryption key in the field that appears.
- Click **Next**.

**Step 3 of 4. Resources**

- **Compute zone** - choose a baremetal compute zone to build the baremetal server on.
- **Compute resource** - Choose a specific baremetal compute resource to reside the baremetal server on. Please note: you can only reside your baremetal server on cloud booted Xen compute resources.

- **Network Zone** - choose a network zone from the drop-down list.
- **Network** - choose the network from which the baremetal server should get the IP address
- **Show only my IP addresses** - tick this checkbox to view only own IP addresses in the IP addresses dropbox.
- **Selected IP address** - the Baremetal Server's selected IP address.
- Click **Next**.
Step 4. Recipes

- Choose a recipe you want to assign to this baremetal server by dragging the required recipe to the **Assigned recipes** pane.
- To add a custom variable, click the "+" button next to the **Custom recipe variables** title bar, then specify variable details:
  - Specify the recipe name and its value.
  - Move the **Enabled** slider to the right to allow use of this variable.

At the Confirmation step you can find the configuration summary of the baremetal server, which will be created. You can view template's name, RAM size, number of networks, primary disk and swap disk size, number of cores.

4. Click **Submit** button. The baremetal server will be added to the system. You can view it under the **Baremetal Servers** menu.

You can find the list of templates for baremetal server creation under the following links (marked by “Yes” in column “Baremetal”):

- [http://templates.repo.onapp.com/Linux_templates.html](http://templates.repo.onapp.com/Linux_templates.html)

The image templates for provisioning the baremetal servers are stored in the following locations depending on the configuration:

1. If **Use SSH File transfer** CP configuration option is enabled in Control Panel **Admin > Settings > Configuration menu**, then the image template will be fetched from the specified server.

2. If **Use SSH File transfer** option is disabled, the image templates are located at `/onapp/templates`, which is mounted from server specified in **Static Config target** CP configuration option (Control Panel > **Admin > Settings > Configuration** menu). Usually this is set to Control Panel server IP, but you can change it to be any other server.

8.6.4 Edit Baremetal Server

You can edit baremetal server details via the Control Panel > **Cloud > Baremetal Servers** menu.

To edit the baremetal server details:

1. Go to your Control Panel > **Cloud > Baremetal Servers** menu. On the screen that appears you'll see the list of all baremetal servers.
2. Click the required server name (label).
3. Click the **Actions** button, then click **Edit**.
4. On the screen that follows, change the server details.
5. Click the **Save** button to save your changes.
8.6.5 Delete Baremetal Server
To remove a baremetal server from the cloud:
1. Go to your Control Panel > Cloud > Baremetal Servers menu.
2. On the screen that appears, you’ll see the list of all baremetal servers in the cloud. Click the label of the server you want to delete.
3. On the baremetal server screen, click the Tools button, then choose Delete Baremetal Server.

After a user has been deleted a baremetal server, OnApp administrator receives an email notification. After that, administrator must reclaim a baremetal compute resource by manually rebooting it, to make it available for new baremetal server creation.

8.6.6 Manage Baremetal Server Recipes
To manage baremetal server recipes:
1. Go to your Control Panel > Cloud > Baremetal Servers menu.
2. Click the label of the server you're interested in.
3. Click the Tools tab, then choose Recipes.
4. The screen that follows shows details of the available recipes the cloud:

- The left pane shows the list of available recipes organized into recipe groups.
- The right pane displays the list of events to which the recipes can be assigned to. Click the arrow button next to event to expand the list of recipes assigned to it.

Assign recipe
Drag and drop recipe to assign it to a desired event.

You can assign baremetal server recipes to the following events:
- **VS provisioning** - run the recipe during baremetal server provisioning

To use drag and drop:
1. Click the arrow button in front of the required event to unfold it.
2. Select the required recipe in the left pane and hold it down with the left mouse button.
3. Drag the recipe up to the right pane and release the mouse button to drop the recipe and add it to the required event.

Remove recipe
To remove recipe:
1. Click the arrow button in front of the required event to view the list of recipes assigned to it.
2. Click the Delete button next to the recipe you want to remove.

8.6.7 Manage Baremetal Server Recipe Custom Variables
You can define custom variables for particular baremetal servers. Each custom variable is a name-value set that can be used during the recipe implementation. Custom variables are set on a per server basis. You can create custom variables during the baremetal server creation or via the baremetal server Tools menu.
To create a new custom variable:

1. Go to your Control Panel > Cloud > Baremetal Servers menu.
2. You’ll see a list of all baremetal servers in your cloud. Click the name of a server for which you want to create a variable.
3. On the baremetal server details screen, click the Tools tab, then choose Custom Recipe Variables.
4. On the screen that appears, click the "+" button.
5. Specify the recipe name and its value.
6. Move the Enabled slider to the right to allow use of this recipe.
7. Click Save.

To edit a custom variable, click the Edit icon next to the required variable and change its details.

To delete a custom variable, click the Delete icon next to the variable you want to remove. You will be asked to confirm the deletion.

It is possible to set custom variables for image templates, as well as for baremetal servers.

Baremetal server custom variables will always overlay template custom variables.

8.6.8 Baremetal Server Billing

Baremetal servers are billed in a slightly different way than other server types. You can only set IP address and template limits and prices for your baremetal servers.

To charge for baremetal server resources:

1. Create a baremetal server compute zone and attach baremetal compute resources to this zone.
2. Create a bucket and set the monthly fee for it.
3. Add this compute zone (baremetal server type) to the bucket.
4. Add a network zone to the bucket.
5. Set the IP address limits for VSs powered off. Each server deployed will take an IP from the network zone added to the bucket, and will be billed for each IP address taken. For more information, see Buckets.
6. Go to Cloud > Template Store menu and set the template prices. Each time a baremetal server is built on the specific template, the user will be charged the amount set. For more details, see Template Store.
7. Add the required template store to the bucket.
8. Assign user to this bucket.
9. Create a baremetal server under this user's account based on the baremetal compute resource in a compute zone that you've just added to the bucket.

Do not set any other limits except the ones described above.
8.6.9 Baremetal Server Recovery Mode

To reboot baremetal server in the recovery mode:
1. Go to your Control Panel > **Cloud** > **Baremetal Servers** menu.
2. On the screen that appears, click the label of the baremetal server you want to reboot in the recovery mode.
3. On the baremetal server screen, click the **Tools** button, then choose **Enable Recovery Mode**.

To disable recovery mode for a baremetal server:
1. Go to your Control Panel > **Cloud** > **Baremetal Servers** menu.
2. On the screen that appears, click the label of the required baremetal server.
3. On the baremetal server screen, click the **Tools** button, then choose **Disable Recovery Mode**.

8.7 Load Balancers

Load Balancers, both autoscaling clusters and load balancer clusters, can only be created on the basis of Virtual Servers, and are not available for Smart Servers, Baremetal Servers, or VMware Virtual Servers.

Load balancing aids application availability and scalability. There are two load balancing options in OnApp:

- **Load balancer clusters**
  With this option, you specify which VSs (nodes) will participate in a load balancer cluster. Incoming traffic is distributed evenly between all the VSs added to a cluster – you still present a single host name to end users, but they actually access the cluster of VSs rather than a single end point. This helps application availability: if one VS fails, traffic is automatically routed to another in the cluster. You can add and remove cluster VSs as required.

- **Autoscaling clusters**
  VS Autoscaling increases or decreases your VS capacity by automatically adding or removing nodes to a cluster. The cluster is scaled in (decreased) or out (increased) based on rules you specify in the Control panel. This aids application performance and scalability.

For instance, you can create a rule that will add 3 more nodes to a cluster if CPU usage has been more than 90% for the last 5 minutes; or rules that remove a node if there has been more than 256 MB RAM free for the last 20 minutes.

8.7.1 View Load Balancer Details

Load balancers are also virtual servers, so you can perform the same basic actions on them as for other VSs. To view load balancer details:
1. Go to your Control Panel > **Cloud** > **Load Balancers** menu.
2. Click the label of the load balancer you are interested in.
3. The screen that appears loads the load balancer properties, billing statistics and tools for managing your load balancer.

8.7.1.1 Load balancer overview
Load balancer properties page gives general overview of the load balancer details:

- **Compute resource**
- **Owner**
- Estimated Price per hour. This sum does not take into consideration the free limits for resources set in the bucket. Therefore, the final price for the server might differ from the sum indicated here.
- **Power status & On/Off buttons**
- **Allocated memory**
- **CPUs**
- **Disk size**
- **IP addresses**
- **Network speed**
- **IPs**
- **Hostname and login**
- **Administrator's/user's notes**
- **List of cluster nodes**
- **Activity log**

Add admin's or user's note to create a brief comment or reminder.

To expand the load balancer **Tools** menu, click the **Tools** button on the load balancer's details screen. **Tools** menu enables you to perform the following actions on load balancers (the exact list shown depends on the load balancer status):

8.7.1.2 Tools
The exact list of load balancer tools shown depends on the load balancer status:

**Power options**
- **Startup Balancer** - queues a start-up action for a balancer that's currently powered off.
- **Reboot Balancer** - powers off and then restarts the balancer.
- **Shut Down Balancer** - terminates the balancer forcefully.
- **Suspend Balancer** - stops a balancer, and changes its status to suspended.

**LB options**
- **Delete Balancer** - removes the balancer from the system.
- **Edit Balancer** - redirects to the edit load balancer details page.
- **Migrate Balancer** - pops up the balancer migration dialogue, enabling you to move the balancer to a different compute resource.
- **Rebuild Balancer** - pops up the balancer rebuild dialogue, where you can rebuild the balancer on the same (or another) template. All data will be lost!

**Cluster Nodes**
This is the list of the nodes which form the load balancer. Here you can:

- **Power on/off** the node.
- **Delete** a node from a cluster.

To view load balancer’s billing statistics or autoscaling monitors, click the appropriate tab.

### 8.7.2 Create Load Balancer Cluster

In this scheme, load balancers manage incoming requests one by one, rotating them between the servers added to a cluster (a round-robin method). OnApp load balancers are based on Layer four load balancing which means that requests are distributed at the transport layer, such as TCP/UDP transport protocols. To add an LB cluster:

1. Go to your Control Panel > **Cloud** > **Load Balancers** menu.
2. Click the **Add a New Balancer** button.
3. On the page that follows, fill in the form that appears:
   
   **Cluster Configuration**
   
   - **Port** - specify the port for this load balancer to run on (e.g. 9090, 8080, 9008 etc.)

   To add multiple load balancer ports, click the "+" button next to the first port.

   **Load Balancer Instance**
   
   - **Label** – give a name to your load balancer instance.
   - **Hostname** – specify a hostname that will identify your load balancer.
   - **Compute zone** – choose a compute zone.
   - **Compute resource** – select a compute resource that will be enabled for the cluster.
   - **Network zone** – choose a network zone for this load balancer.
   - **Port Speed** – use the slider to set a port speed or tick the **Unlimited** box if required.
   - **CPU Priority** - set the load balancer’s CPU priority.

   **Load Balancer Type**
   
   - **Load Balancer Type** - choose the **Cluster** option and click **Next**.

   **Cluster Nodes**
   
   This is where you add and configure the nodes in this load balancing cluster. A node is a combination of a VS and an IP address.
   
   - **Virtual Server** - select a virtual server from the drop-down box and click the **Add Node** button.

The only VSs you can add to a cluster are those which are based on the selected compute resource/compute zone, have an IP in the defined network zone and are located in the same IP range.

Enabled anti-spoofing would prevent adding Windows-based virtual
servers as nodes to the load balancer cluster. To disable anti-spoofing
reboot windows-based nodes from Control Panel after they are added
to the cluster.

4. Click **Save**.

### 8.7.3 Create Autoscaling Cluster

To add an autoscaling cluster to your cloud:

1. Go to your Control Panel > **Cloud** > **Load Balancers** menu.
2. Click the **Add a Balancer** button.
   
   On the page that follows, fill in the form that appears:

   **Cluster Configuration**
   
   - **Port** - specify the port for this load balancer to run on (e.g. 9090, 8080)

   **Load Balancer Instance**
   
   - **Label** – give a name for your load balancer instance.
   - **Hostname** – specify a host name which will identify your load balancer.
   - **Compute zone** – choose a compute zone.
   - **Compute resource** – select a compute resource that will be enabled for the cluster.
   - **Network zone** – choose a network zone for this load balancer.
   - **Port Speed** – use the slider to set a port speed or tick the Unlimited box if required.

   **Load Balancer Type**
   
   - **Load balancer type** - choose the **Autoscaling** option and click **Next**.

   **Cluster Nodes**
   
   These settings configure the nodes that will be added to your cluster.

   **Nodes network**
   
   - **Nodes network group** - the nodes network group for the cluster nodes.

   **Cluster Node Template**
   
   - **Image template** – choose a template from the drop-down box: nodes will be built on this template
   - **Min node amount** – the minimum number of nodes in this cluster.
   - **Max node amount** – the maximum number of nodes in this cluster.

   Example: if you set **Min node amount** = 2 and **Max node amount** = 5, then the system will scale out the cluster up to 5 nodes, and scale in to 2 nodes if required.
The only templates you can add to a cluster are those based on the selected compute resource/compute zone.

**Cluster Node Parameters**
These are the settings for each node of a cluster. Each node added to a cluster will have the following parameters:
- **Memory** – set the amount of memory allocated per node in MB.
- **CPUs** – the number CPUs which will form each node.
- **CPU Priority** – specify CPU priority. For more info on CPU priority, refer to [Create VSS](#) section.
- **Rate Limit** – set the port speed for a node.

**Autoscale Out Parameters**
Set the rules defining when the system should add more nodes to your autoscaling cluster. The system will add nodes until the limit set in the Max node amount field is reached.

**Autoscale In Parameters**
Set the rules defining when the system should remove the nodes from your autoscaling cluster. The system will remove nodes until the limit set in the Min node amount field is reached.

3. Click **Save**.

### 8.7.4 Edit Load Balancer

To edit a load balancer:

1. Go to your Control Panel > **Cloud** > **Load Balancers** menu.
2. Click the **Actions** icon next to a required load balancer, then choose **Edit Cluster**.
3. When the page loads, edit necessary parameters and click **Save**.

When you increase the RAM of the nodes of a load balancer (autoscaling type) to a value greater than the current node RAMx16 (which is a max_mem parameter in a configuration file and database), the load balancer will be cold resized.

When deleting load balancer ports, you can remove all but the first port.

### 8.7.5 Delete Load Balancer

To delete a load balancer:

1. Go to your Control Panel > **Cloud** > **Load Balancers** menu.
2. Click the **Delete** icon next to a required load balancer.
3. Click **OK** to confirm the deletion.
8.7.6 View Load Balancer Billing Statistics

To view billing statistics for a load balancer:

1. Go to your Control Panel > Cloud > Load Balancers menu.
2. Click the label of the balancer you're interested in.
3. Click the Billing Statistics tab.
4. You can filter the statistics by date and time - select the time period from the drop-down menu and click the Apply button. By default, the statistics are generated for the last three months or the actual VS existence period.
5. Tick the Show in my Timezone box to show bandwidth statistics according to your profile's timezone settings.
6. On the page that appears:

   - **Date** – particular date and time for the generated statistics
   - **Users** – the load balancer owner. Click the owner name to see the User Profile (user details)
   - **Virtual Servers** – the virtual server name with the total due for LB resources (CPU priority, CPUs, memory and template resources) for the point of time specified in the Date column.
   - **Network Interfaces Usage** – the total due for the network interfaces used by this LB for the point of time specified in the Date column. Click the network interface name to see its details.
   - **Disks Usage** – the list of disks assigned to this LB with the total due for the disk space resources (disk size, data read/written, reads/writes completed) for the point of time specified in the Date column. Click the disk name to see its details.
   - **Costs** – the total due for the Virtual Servers, Network Interfaces and Disks resources at the point of time specified in the Date column.

Scroll down to see Total Amount (the total due for the whole billing statistics period).

8.7.7 View Load Balancer Autoscaling Monitors

Autoscaling monitors provide information about the cluster load.

To view the load balancer's autoscaling monitors:

1. Go to your Control Panel > Cloud > Load Balancers menu.
2. Click the label of the balancer you're interested in.
3. Click the Autoscaling Monitors tab.
4. On the screen that appears, you will see the list of autoscaling monitors along with the following details:

   - monitor name
   - virtual server label

Click the label of a monitor you are interested in to view its details:

Depending on the monitor type, the monitor details screen page will show the following info:

   - [memory monitor details screen](#)
   - [CPU monitor details screen](#)
8.7.7.1 Memory monitor

**Memory monitor info:**

- *Name of the memory test* - test label
- *IP of the device agent* - IP address of the agent running on the server
- *Platform* - OS platform
- *The name of the agent* - virtual server identifier
- *Free memory limit* - free memory limit in MB
- *Free swap limit* - free swap limit in MB

**Memory last results:**

- *Free memory* - free virtual server memory in MB
- *Total memory* - total virtual server memory in MB
- *Free swap* - free swap disk size in MB
- *Total swap* (MB)
- *Buffered memory* (MB)
- *Cached memory* (MB)
- *Status* - monitor status: OK, if the monitor is correct or NOK, if the autoscaling configuration does not match. Monitor status is refreshed once in 5 minutes.

8.7.7.2 CPU Monitor

**CPU monitor info**

- *Name of the CPU test* - CPU test label
- *IP of the device agent* - virtual server IP address
- *Max value for kernel* - maximum CPU value for kernel
- *Max value for iowait* - maximum CPU value for iowait
- *Platform* - virtual server OS
- *Max allowed value for user* - maximum CPU value for user processes
- *The name of the agent* - virtual server identifier
- *Tag of the CPU test* - CPU test tag
- *Min allowed value for idle* - minimum CPU value for idle mode
- *Max allowed value for nice* - maximum CPU value for nice

Max value is a CPU priority set during the server creation.

**CPU last results**

- *CPU index* - CPU number
- *User Value* - percentage of CPU used in user mode
- *Kernel Value* - percentage of CPU used by kernel
- *Nice Value* - percentage of CPU time occupied by processes with positive CPU value
- *Idle Value* - percentage of CPU used in idle mode
- *IO Wait Value* - percentage of time the CPU was idle during the IO request

*Status* - monitor status: OK, if the monitor is correct or NOK, if the autoscaling configuration does not match. Monitor status is refreshed once in 5 minutes.
8.8 Compute Resources

Compute resources are Xen or KVM platforms running on bare metal with CentOS Linux as the management operating system, or VMWare ESXi servers. They are used to provide hardware resources for virtual servers, ensuring highly efficient use of available hardware, and complete isolation of virtual server processes. Each virtual server in the cloud is hosted by a specific physical compute resource server, from which it receives CPU time, RAM and storage capacity from the data stores attached to that compute resource. OnApp supports multiple compute resource platforms including Xen, KVM and VMware.

We strongly recommend that you avoid adding CloudBoot and static boot compute resources to one compute zone.

8.8.1 Compute resource features

Compute resources:

- Provide system resources such as CPU, memory, and network to virtual servers
- Control the virtual differentiation of entities such as virtual servers and application data being delivered to cloud-based applications
- Take care of secure virtualization and channelling of storage, data communications and server processing
- Can be located at different geographical zones
- Can have different CPU and RAM

Compute resources can also be organized into compute zones, which make it easy to offer tiered service levels and create private clouds for specific users.

Compute resources can be dynamically booted over the network using the CloudBoot technology, or statically installed from a CentOS base. Note that enabling the OnApp storage platform requires compute resources to be provisioned using the CloudBoot interface. Refer to the CloudBoot Compute Resources section for details.

When a compute resource is inaccessible for a period of time, commands queued during that period of time will be marked as failed. This is an an expected OnApp behavior.

8.8.2 Compute resource management

The main Compute resources section in the left Control Panel menu provides access to basic tools for viewing, editing and rebooting compute resources.

Tools for advanced compute resource management and controlling compute zones are located in the Control Panel's Settings menu (Admin > Settings > Compute resources, and Admin > Settings > Compute zones). For details, refer to one of the following sections of this guide.

- Compute Resource Matrix
8.8.3 Compute Resource Matrix

<table>
<thead>
<tr>
<th>Virtualization Software</th>
<th>Xen 3</th>
<th>Xen 4</th>
<th>KVM 5</th>
<th>KVM 6</th>
<th>KVM 7</th>
<th>VMware</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Feature</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated Storage</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Cloud Boot</td>
<td>Y</td>
<td>N</td>
<td>CentOS 6 64bit (roadmap)</td>
<td>N</td>
<td>CentOS 6 64bit</td>
<td>N</td>
</tr>
<tr>
<td>Smart Servers</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Incremental backups</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Load balancing clusters</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Autoscaling</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Linux VSs only</td>
<td>Linux VSs only</td>
<td>Linux VSs only</td>
<td>Linux VSs only</td>
<td>Linux VSs only</td>
<td>Linux VSs only</td>
</tr>
<tr>
<td>Recipes</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Edge servers</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Ballooning release resource type for Compute zones</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>CPU Units</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td><strong>Virtual server options</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot RAM resize without reboot**</td>
<td>Y</td>
<td>Y</td>
<td>Y**</td>
<td>Y**</td>
<td>Y**</td>
<td>Windows 2008 and Windows 7 VSs</td>
</tr>
<tr>
<td>Hot CPU cores resize without reboot</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Windows 2008 and Windows 7 VSs. Some Linux distributions</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------------------------------------</td>
<td>------------------------------------------------------</td>
<td>------------------------------------------------------</td>
<td>------------------------------------------------------</td>
<td>------------------------------------------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>Hot migration**</td>
<td>Available for some</td>
<td>Available for some</td>
<td>Available for some</td>
<td>Available for some</td>
<td>Available for some</td>
<td>Y (via vCenter)</td>
</tr>
<tr>
<td>Cold migration</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Disk hotattachment /</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Available for Linux VSS</td>
<td>Available for Linux VSS</td>
<td>N</td>
</tr>
<tr>
<td>detachment</td>
<td></td>
<td></td>
<td></td>
<td>(Virtio templates)</td>
<td>(Virtio templates)</td>
<td></td>
</tr>
<tr>
<td>Disk resize (increase/decrease)</td>
<td>Available for Linux VSS</td>
<td>Available for Linux VSS</td>
<td>Available for Linux VSS</td>
<td>Available for Linux VSS</td>
<td>Available for Linux VSS</td>
<td>Y - Increase only. Reboot is required.</td>
</tr>
<tr>
<td></td>
<td>FreeBSD - increase only is available. Disk resize is not available for primary FreeBSD disks.</td>
<td>FreeBSD - increase only is available. Disk resize is not available for primary FreeBSD disks.</td>
<td>FreeBSD - increase only is available. Disk resize is not available for primary FreeBSD disks.</td>
<td>FreeBSD - increase only is available. Disk resize is not available for primary FreeBSD disks.</td>
<td>FreeBSD - increase only is available. Disk resize is not available for primary FreeBSD disks.</td>
<td>Disk size decrease is not available for Integrated Storage.</td>
</tr>
<tr>
<td>IPv6 support ***</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Reboot in recovery</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Segregate</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>VIP status</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Firewall</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backups</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>
** Detailed info about RAM resize without reboot and hot-migrate abilities per template is available at:

- [http://templates.repo.onapp.com/Linux_templates.html](http://templates.repo.onapp.com/Linux_templates.html)
- [http://templates.repo.onapp.com/FreeBSD_templates.html](http://templates.repo.onapp.com/FreeBSD_templates.html)

*** At least one IPv4 address must be allocated to a virtual server's primary network interface, as some applications do not support IPv6.

### 8.8.4 CloudBoot Compute Resources

CloudBoot functionality is a method of compute resource installation without the presence of a local disk or other local storage, utilizing the PXE and DHCP servers. This allows users to both lower their hardware requirements on the compute resources (no local storage is required to boot a compute resource) as well as make the process of adding new compute resources to the cloud more efficient:

- No manual admin work required to boot compute resources
- No local storage needed to boot compute resources
- Self discovery of new compute resources added to the cloud
- Ability to move compute resources quickly between zones
- Ability to move quickly between compute resource KVM and XEN types

To start using CloudBoot, you must enable CloudBoot and Storage in the system configuration first (Admin > Settings > Configuration > CloudBoot). Visit [Configuration Settings](#) chapter for more details.

It's recommended to use a separate network for compute resources when using the CloudBoot system to prevent errors of other servers (not compute resources) on the cloud to boot into the CloudBoot network. All compute resources must reside on the same VLAN (this concerns compute resources only, not the VS's themselves).

The following CloudBoot features are not available in the 3.0 version (they will be introduced in future releases):

- Bonded NICs for the management/boot interface

For details how to create a CloudBoot compute resource, refer to the [Create CloudBoot Compute resource](#) section.

### 8.8.5 VMware Compute Resources

VMware compute resource is a combination of all ESXi compute resources at the vCenter displayed as a single combined compute resource with a sum of the CPU, RAM and Disk resources rather than individual compute resources.

VMware compute resources behave differently from Xen or KVM: with Xen/KVM the control is made directly upon the compute resources, while with VMware OnApp directly controls the
VMware vCenter. This allows vCenter to control the VSs with the full range of VMware functionality including DRS and vMotion to ensure that the operation is optimal.

For details how to create a VMware compute resource, refer to the Create VMware Compute resource section.

8.8.6 View Compute Resources

The Control Panel provides a quick way to see a summary of compute resources available in your cloud. In the Admin section, click All Compute Resources to see a list of all compute resources and the following details:

- Status
- Label
- IP Address
- Type (Xen, KVM, etc)
- Zone
- Location Group
- Failover
- VS (the number of deployed virtual servers)
- CPU
  - Cores
  - Used
  - Available
  - MHZ
- RAM
  - Total
  - Free

If you are viewing the compute resources list on a narrow screen, you can customize the way the table is displayed by clicking the actions icon at the top of the table. In the drop-down list that appears, select the columns you want to see and click Apply. The narrower your screen is, the more deselected columns will be hidden from the table. If your screen is too narrow to fit all the columns you have selected, a scrollbar will appear at the bottom of the compute resources list. You can always change the selection of columns. Note that by default the VS, Used and MHZ columns are not visible in the table on narrow screens.

The selection of columns is currently set for one browser. If you select some columns in one browser and open this page in another browser, the column selection will be the default one for that other browser.
8.8.7 View Compute Resource Details

To view detailed information on a particular compute resource, follow the next steps:

1. In the Admin section, click a label of a compute zone where a target compute resource runs and click a label of a compute resource.

2. On the screen that appears, you will see a list of all virtual servers hosted on the compute resource along with the following details:
   - **OS** - the operating system of the virtual server
   - **Label** - the name of the virtual server
   - **Type** - the type of the virtual instance, for example, **VS** (virtual server), **AS** (application server), **Fed VS** (federated virtual server), **Smart Server**, etc.
   - **VIP** 🏷️ - the icon that indicates whether the VIP status is enabled for the virtual server. If the 🏷️ icon is dimmed, the VIP status is not enabled. Click the icon to enable the VIP status for the VS.
   - **IP Addresses** - the IP address of the virtual server
   - **Disk size** - the disk size of the virtual server in GB
   - **RAM** - the amount of RAM allocated to the virtual server in MB
   - **Backups** - the number of backups and the space these backups take in GB
   - **Compute Resource** - the compute resource on which the virtual server runs
   - **User** - the user who created the virtual server
   - **Power** - the power status of the virtual server that can be **powered on** or **powered off**
   - **Actions** - the list of actions available for the virtual server. The list of available actions for the virtual server depends on the VS power status.
     - **Startup**
     - **Shutdown**
     - **Reboot**
     - **Recovery Reboot**
3. To view details of a specific VS, click its label.

At the compute resource details page, you can also power on/off multiple virtual servers. For more information, refer to the Manage Virtual Server Power Options guide.

8.8.8 Edit Compute Resource Details

You can edit compute resource details (its label, type, IP address and so on) via the compute resource details screen, or through the Control Panel > Admin > Settings > Compute Resources menu (see Compute Resources section for details: the editing functionality is the same whichever method you choose.)

To edit compute resource details:

1. Go to your Control Panel > Admin > Settings > Compute Resources menu (or click a compute zone name underneath it). On the screen that appears you'll see a list of compute resources.
2. Click a compute resource's name (label).
3. Click the Tools button, then click Edit Compute resource.
4. On the screen that follows, change details as required:
   - The compute resource's name (label)
   - Compute resource type
   - Its IP address
   - Backup IP address
   - CPU units
   - Whether it's enabled or not (compute resources that are not enabled cannot be used to host VSs)
   - Move the slider to the right to collect statistics for the compute resource.
   - Move the slider to the right to disable failover. Compute resource failover means VS migration to another compute resource if the compute resource on which it is running goes offline.
     - When you assign compute resource to the new compute zone without any compute resources, the disable failover zone’s parameter automatically takes the value of the compute resource.
     - When all compute resources within the zone have the same value, the compute zone’s disable failover status will be the same, otherwise the compute resources zone’s failover status will be set to disabled.
     - When you change the compute zone’s disable failover value, this change will be applied to all compute resources within this zone.
   - Power Cycle command
5. Click the Save button to save your changes.

You can also edit your compute resources in the Control Panel's Settings menu.
8.8.9 Reboot Compute Resource

To reboot a compute resource:

1. Go to your Control Panel > Admin > Settings > Compute Resources menu (or click a compute zone name underneath the main compute resource menu link).

2. Click the label (name) of the compute resource you want to reboot.

3. On the compute resource details screen that follows, click the Actions button, then click Reboot Compute Resource.

4. A new screen will open asking for confirmation (via three checkboxes) before reboot:
   - Start running virtual servers after reboot? If this option enabled the system will initiate the failover process. The failover process will be initiated despite the Disable Failover configuration for compute resource or compute zone.
   - Stop all virtual servers that cannot be migrated to another compute resource? Check this box if you want VSs that cannot be migrated to be powered off. When a compute resource is scheduled for a reboot, OnApp will first attempt to hot migrate all VSs it hosts. If hot migration is not possible for a VS, OnApp will attempt to cold migrate that VS. With this box checked, if cold migration fails, the VS will be stopped so the reboot may proceed. If you don’t check this box, OnApp will attempt to hot and then cold migrate all VSs hosted by the compute resource being rebooted – but will stop the migration process if any VS cannot be migrated.
   - Are you sure you want to reboot this compute resource? A simple confirmation to confirm that you want the compute resource to reboot.

5. When you’re certain you want to proceed with the reboot, click the Reboot button.

Reboot option is not available for VMware compute resources.

If your backups disappear after rebooting the CloudBoot compute resource with LVM storage which is used as a backup server, add mount command to CloudBoot backup server custom config after the reboot. This is a known issue which will be fixed in the future release.

To fix your custom config settings, use one of the following options provided in the examples below (you will have to specify your own device names):

1. If you have a separate partition for backups and templates (/dev/sda1 and /dev/sda2)
   - mkdir -p /onapp/backups
   - mkdir -p /onapp/template
   - s mount /dev/sda1 /onapp/backups
   - mount /dev/sda2 /onapp/templates

2. If you current array is detected as /dev/sda1 and currently everything is located in /onapp within templates and backup directories within:
8.9 Assets

Assets are compute resources that are connected to the Control Panel server but are either not configured or not assigned to a compute zone.

Compute resources that are not configured yet are accessed via the **Cloud > Assets** menu.

Compute resources that are already created but not assigned to the compute resource group are managed via the Control Panel > **Cloud > Assets** menu. They are managed exactly the same as compute resources.

Click your Control Panel's main **Assets** menu to see the list of all unassigned compute resources in your cloud, and a quick overview of their details:

- **Label**
- **IP address**
- **Type (Xen, KVM etc)**
- **Zone**
- **Location Group**
- **Failover status**
- **VSSs**
You can drill into a specific asset to add virtual servers to that compute resource, edit resources, or reboot an asset. To do so:

1. Go to your Control Panel > **Cloud** > **Assets** menu. On the screen that appears you'll see the list of assets.
2. Click an asset's name (label) to see its details screen.
3. On the screen that appears:
   - click the "+" sign to add a VS to this compute resource. You'll be prompted to a VS Creation Wizard.
   - click **Tools** > **Edit compute resource** to change its details and resources.
   - click **Tools** > **Reboot compute resource** to reboot an asset.

### 8.10 Virtual Routers

Virtual routers are appliances converted from the virtual servers based on OVA and KVM templates. Once converted, virtual routers preserve all the data and functionality of the virtual servers. Virtual routers provide the users with the possibility to manage their private SDN networks independently from the cloud owner. Virtual routers allow independent IP nets routing management and so save time spent on networking configuration. Also, they provide an additional level of security for private networks as all traffic inside SDN is isolated.

To be able to use virtual routers functionality, you should have the *Any actions on Virtual Routers* permission enabled for your user role. For details on permissions, refer to the [Permissions List](#) section.

---

**On this page:**

- Convert Virtual Server to Virtual Router
- View Virtual Routers
- Assign IP Net to Router
- Unassign IP Net from Router

**See also:**

- Create and Manage SDN Networks
- Manage OVAs
- Manage OVA Virtual Servers
8.10.1 Convert Virtual Server to Virtual Router

Note that you cannot convert a virtual router to a virtual server.

To convert a virtual server to a router, do the following:

1. Go to your Control Panel > Cloud > Virtual Servers menu.
2. Click the Actions button next to the virtual server you want to convert to a router and select Convert to Virtual Router.
3. Click the Convert button.

After the VS has been converted to a router, it disappears from the VSS list and is present in the routers' list at Control Panel > Cloud > Virtual Routers menu. Virtual routers preserve all the functionality of the virtual servers.

8.10.2 View Virtual Routers

To view the list of virtual routers:

1. Go to your Control Panel's Virtual Routers menu.
2. The page that loads will show the list of virtual routers together with their details:

   - **OS** - the operating system of the virtual router
   - **Label** - the name of the virtual router
   - **VIP** - the icon that indicates whether the VIP status is enabled for the virtual router. If the icon is dimmed, the VIP status is not enabled. Click the icon to enable the VIP status for the virtual router
   - **IP addresses** - the IP address of the virtual router
   - **Disk Size** - the disk size of the virtual router in GB
   - **RAM** - the amount of RAM allocated to the virtual router in MB
   - **Backups** - the number of backups and the space these backups take
   - **User** - the owner of this virtual router. Click the username to see the owner details.
   - **Power** - the power status of the virtual router that can be **powered on** or **powered off**

To view a particular virtual router details, click the label of a required virtual router.

8.10.3 Assign IP Net to Router

Users can assign IP nets to virtual routers from their SDN networks.

To assign IP net to a router:
1. Go to your Control Panel's **Virtual Routers** menu.
2. Click the label of the virtual router you're interested in.
3. Click the **Routing** tab. The page that loads will show the list of already assigned IP nets and IP nets that you can assign. One IP net can be associated with one router.
4. Click the "+" button next to the IP net you want to assign to a router.

---

8.10.4 **Unassign IP Net from Router**

To unassign IP net from a router:

1. Go to your Control Panel's **Virtual Routers** menu.
2. Click the label of the virtual router you're interested in.
3. Click the **Routing** tab. The page that loads will show the list of already assigned IP nets and IP nets that you can assign.
4. Click the "-" button next to the IP net you want to unassign from a router.
9 Templates

9.1 What templates are

OnApp templates are used to deploy virtual servers in your cloud. A template is a fully preconfigured operating system environment – a tar + gzip archive that contains the root directory of an operating system. A basic template includes the data needed for a minimum OS installation, but templates may also include applications and additional OS components.

9.2 Windows templates version 4.0

OnApp version 4.0 introduces new Windows templates version 4.x with Cygwin as SSH server (instead of CopSSH as in versions 3.x). These templates are currently in beta.

- New 4.0 templates cannot be used in OnApp version 3.x or below.
- Windows templates version 3.x can be used in OnApp version 4.0 without restrictions.

Windows Server 2003/XP OSs come to their end-of-life on July 14th, 2015 and will no longer be supported.

9.3 Types of templates

There are two different kinds of template:

- **System templates** These are provided by OnApp and downloaded from an online library. They comprise an operating system with the latest set of packages installed. Windows 2008 templates require 20GB of free disk space. Windows 2003 templates require 10GB. Most Linux templates require 2–10GB.

  Some Windows Templates with additional software may require minimum disk size of 30 GB - e.g. `win12_x64_std-sqlweb-ver3.2-kvm_virtio`.

  Minimum disk size for new 4.0 Windows templates is 30 GB (40 GB for templates with MS SQL).

- **Custom/user templates** These are templates you create by backing up an existing virtual server, and converting that backup to a template. This allows you to pre-configure virtual servers (for example with specific OS settings, or pre-installed applications) and use the same configuration again and again.

9.4 Miscellaneous

You can use the following templates for smart servers and baremetal server creation:

<table>
<thead>
<tr>
<th>OS</th>
<th>Baremetal Servers</th>
<th>Smart Servers</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Baremetal Servers</td>
<td>Smart Servers</td>
</tr>
<tr>
<td>----------</td>
<td>------------------------------------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Windows</td>
<td>2008 R2 Standard Edition</td>
<td>Windows 2008 x64 STD R2 XEN 3.1</td>
</tr>
<tr>
<td></td>
<td>2008 R2 Data Center Edition</td>
<td></td>
</tr>
<tr>
<td>Linux</td>
<td>CentOS 6 64 bit</td>
<td>Debian 6.0 x64</td>
</tr>
<tr>
<td></td>
<td>Redhat 6 64 bit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Debian 6 64 bit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ubuntu 12 64 bit</td>
<td></td>
</tr>
</tbody>
</table>

- It is not possible to change or reset the password if the Windows virtual server with Active Directory Domain Controller is used as a domain controller.

### 9.5 Template List

The Control Panel's Templates List menu displays all of the templates available on your system, their version number, the Operating System they install, whether swap disk is allowed, and whether you can adjust their CPU cores/priority & RAM without rebooting a virtual server based on that template ("resize without reboot"). By clicking on the template you may see what virtual servers are based on that specific template.

The templates are organized into three tabs:

- **All Templates** - all System templates and your templates
- **System Templates** - the OS images provided by OnApp.
- **My Templates** - the list of custom templates you created from backups.

In My Templates tab you will be able to perform a specific action with required template, such as: make it public, edit, or delete it.

### 9.5.1 Create Custom Templates

You can create custom templates by making a backup of an existing virtual server and saving it as a template for future use. To create a custom template:

1. Create a new virtual server and configure it as you would like for your template.
2. Click the **Actions** icon next to this virtual server, then choose **Backups**.
3. In the list of backups, click **Convert to Template** next to the backup you want to convert.
4. On the next screen, enter the following:
   a. A label for your template.
   b. The minimum memory size: make sure the minimum memory size takes into account the settings for the template on which the VS was built, plus any modifications you may have made to the template before making the backup.
   c. The minimum disk size: ensure the value is based on the template settings and any possible modifications you may have made, e.g. installing additional software.
d. Click the **Convert Backup** button.

5. The backup will be scheduled for creation. When conversion is complete, it will be then listed on the **Cloud > Templates > Templates List > User Templates** tab, from where you can edit it.

- If templates limit has been exceeded, you will get the following error message: "You have reached your template creation limit".
- During the custom Windows template creation the Admin account is created anew.
- To select a preferred licensing type (KMS, MAK, own) for a Windows virtual server built on a custom template you need to add this custom template to **My Template Groups** and associate the desired licensing type with such group.
- When updating a custom template (by converting a more recent backup of a VS, for example), existing VSs built on previous versions will not be updated. Only new VSs, or those that are rebuilt, will use the new template.

9.5.2 **Delete Custom Templates**

You can delete your templates. To do so:

1. Go to your Control Panel > **Cloud > Templates > Templates List** menu and click the **My Templates** tab. Your custom templates will be listed there.
2. Click the **Actions** icon next to the template you want to delete.
3. Choose the **Delete Template** button next to a template if you want to delete it.
You cannot delete a template if there is a virtual server in your system, which was built on that template. To remove such template you will have to destroy the said virtual server first.

9.5.3 Edit Template Details
You can edit a range of template details through the Control Panel, including minimum disk size required, version number, filename and label. To do so:
1. Go to your Control Panel > Cloud > Templates > Templates List menu. You'll see a list of templates on your system.
2. Click the Actions icon next to the template you want to change, then choose Edit Template.
3. On the screen that follows, enter template details as required:
   - Label – change the template name
   - Filename – edit the template filename
   - Version – the template version
   - Min disk size – the minimum VS disk size required to build a VS on this template (in GB)
   - Min memory size – the minimum VS RAM required to build a VS on this template (in MB)
4. Click the Save button to finish.

9.5.4 Make Templates Public
By default your custom templates are available only to you, as a user who created them from the backup. To make your custom templates available to all users:
1. Go to your Control Panel > Cloud > Templates > Templates List menu.
2. Click My Templates tab.
3. Click the Actions button next to the template you want to make public, then select Make Public.
4. Confirm the window that pops up.
When you make a custom template public, it is moved to a System templates tab.

9.6 Template Store
Template store shows a number of groups, which include different system templates.
The template store groups have hierarchical (tree) structure:
- Template group – e.g. OS
- Child group
- Templates
Click the Template group's label to expand the list of child groups, then click the template group's label to view the list of templates, respectively.
9.7 My Template Groups

Template groups enable you to organize your custom templates into your own groups. Also, for Windows based templates, My Template Groups provide the possibility to use your own licensing type regardless of your bucket.

For your convenience, My Template Groups have hierarchical (tree) structure:

- Template group – e.g. OS
- Child group
- Templates

You may assign templates directly to the group, or create a child group(s) and assign templates there.

**To add a template group:**

1. Go to your Control Panel > Cloud > My Template Groups menu.
2. On the page that follows, click the "+" button.
3. Give a name to your group in the window that appeared.
4. If you are planning to use this group for Windows templates, specify the Windows Licensing type: MAK, KMS, or Own (user license).
   
   This licensing type will apply to all templates directly in the group and in the child groups.

5. For KMS licensing, set the following parameters:
   
   - `Server label` – the name of the KMS server
   - `KMS server host` – the hostname of the licensing server
   - `KMS server port` – the port used to connect to the licensing server

6. Click Save.

On the page that appears, you can add a template or a child group to the group, edit the group, or delete it.

**To view/edit/delete a template group:**

1. Go to your Control Panel > Cloud > My Template Groups menu.
2. On the page that follows, you’ll see the list of all template groups created within your cloud:

   - Click the group's label to see the child groups or the list of templates assigned to this group; click the child group label to see the list of templates assigned to the child group.
   - Click the Edit icon next to a group or a child group to edit its name and the type of Windows licensing; click Save button upon making the necessary changes.
   - Click Delete icon to delete a group or a child group. The templates which were assigned to this group/child group will become your ungrouped templates.

**To add a child group to the group:**

1. Go to your Control Panel > Cloud > My Template Groups menu.
2. Click the "+" button against the required group.
3. Select Add Child from a drop-down menu.
4. In the screen that appears fill in:
   - Label – name of the child group
   - If you are planning to use this group for Windows templates, specify the Windows Licensing type: MAK, KMS, or Own (user license).
     
     This licensing type will apply to all templates in the child group. Providing you have indicated the licensing type for the parent group - both types will apply

     - For KMS licensing, set the following parameters:
       - Server label – the name of the KMS server
       - KMS server host – the hostname of the licensing server
       - KMS server port – the port used to connect to the licensing server

     Providing the KMS licensing was selected for the parent group, both KMS servers will be available for selection while creating a virtual server based on the templates in the child group

5. Click Save

To assign a template to a template group / child group:
1. Go to your Control Panel > Cloud > My Template Groups menu.
2. Click the "+" button next to the required group's label, then select Add Template, or click on the group's label to expand it, then click the "+" button next to the required child group's label.
3. Choose the template from the drop-down box at the Add a template section.

Only your custom templates will be available for selection

4. Click Save.

To remove a template from a template group:
1. Go to your Control Panel > Cloud > My Template Groups menu.
2. Click the template group's label or click the name of the template group from which you wish to remove a template.
3. Click the Delete icon next to a template you want to remove.
4. Confirm the deletion.
9.8 ISOs

OnApp allows uploading custom bootable ISOs for recovery purposes. These could be different images for Windows/Linux/FreeBSD or any additional software.

Currently, user can only view public ISOs.

To view the ISOs available to you:
1. Go to Control Panel > Cloud > Templates.
2. Select ISO list from the menu that expands.
3. The page that loads, will show the list of ISOs available to you separated into three tabs:
   - All ISOs - the list of all ISOs available on your system
   - System ISOs - the list of the ISOs that are publicly available to all users

For each ISO listed, you see the following details displayed:

- log status - the status of the last log item of the ISO (complete/pending/failed). Click the status to view the log details for the ISO (available to the ISOs that were uploaded through an URL).
- OS - the icon that indicates the operating system of the ISO
- Label - the name of the ISO
- Min memory size - the minimum RAM size required for the ISO
- Operating systems - the operating system on the ISO
- Virtualization - the virtualization type chosen for the ISO
10 Recipes

The recipe is the plug-in mechanism used for adding new functionalities to the OnApp cloud. Each recipe is a set of instructions that triggers events at certain stages during the execution of certain services/event in the cloud. Essentially, recipes allow to input code into virtual servers, appliances or the Control Panel server for administrator to use it for configuring the server or report on it, thus providing advanced customization options in a standard environment.

Recipes run over SSH, and all commands triggered can run on virtual servers, appliances or the Control Panel server.

SSH connection is not required for running recipes on VMware virtual servers.

OnApp CP does not update the status of the recipe if it takes longer than 1 hour to complete the transaction. As a result, cPanel will complete the installation, but the task will be displayed as still running. This issue will be fixed in next releases.

Currently it is not possible to execute recipes using cPanel/CloudLinux template with the /tmp mounted as noexec.

10.1 Recipe use

Recipes allow to perform the following operations:

- Perform post script installation.
- Use post provision installation scripts for third party applications, agents, etc.
- Disk reclaiming.
- Update/modify virtual servers and compute zones with script injection.
- Allow host to spin up custom virtual servers without requiring custom templates.
- Download, run and report audit tools.

Use of recipes brings cloud administrators more control of their cloud environment and allows to self-maintain such tasks as custom template creation, etc.

You can utilize recipes for Unix (Linux and FreeBSD) and Windows virtual servers, smart servers, baremetal servers, virtual server templates, compute zones and the control panel server. For details, refer to the relevant sections of the Admin guide:

- Template Recipes
- Virtual Server Recipes
- Smart Server Recipes
- Baremetal Server Recipes

To be able to use recipes in the cloud, you must have recipe permissions enabled first.
10.2 Recipe variables

Here is the list of variables that you can define in recipes:

**Compute resource variables**
- IP_ADDRESS - compute resource IP address
- VIRTUALIZATION - compute resource virtualization type; Xen, KVM or VMware
- SERVER_TYPE - server type: virtual, smart or baremetal

**Virtual Server variables**
- VM_IDENTIFIER - virtual server identifier
- IP_ADDRESS - virtual server IP address
- HOSTNAME - hostname of a virtual server
- ROOT_PASSWORD - server root password
- OPERATING_SYSTEM - virtual server operating system
- OPERATING_SYSTEM_DISTRO - virtual server OS distribution
- OPERATING_SYSTEM_ARCH - architecture of the operating system
- OPERATING_SYSTEM_EDITION - edition of the OS

All recipes have access to these variables:
- CP_ADDRESS - control panel server IP address
- RESPONSE_FROM_PREVIOUS - response from the previous recipe step

Each user can set custom recipe variables. For details, refer to the Manage Virtual Server Custom Variables section of this guide.

10.3 View List of All Recipes

To view the list of all recipes:
1. Go to your Control Panel > Cloud > Recipes menu.
2. On the screen that appears, you’ll see the list of all recipes in the cloud.

Use the tabs above to view the particular recipe type:
- **All**
- To view the list of all recipes, click the All Recipes tab.
- **Unix compatible**
- To view the list of Unix compatible recipes, click the Unix Compatible tab.
- **Windows compatible**
- To view the list of Windows compatible recipes, click the Windows Compatible tab.
- **Unowned**
- To view the list of recipes which owners have been deleted, click the Unowned Recipes tab.

Recipes that run on other user's resources are not deleted after their owners are removed. These recipes can be accessed via Recipes > Unowned recipes menu. A user with global
permissions can become an owner of any of the unowned recipes by choosing **Actions > Become an owner**.

To **view a particular recipe details**, click the label of a required recipe.

### 10.4 View Recipe Details

To view the recipe details:

1. Go to your Control Panel > **Cloud > Recipes** menu.
2. On the screen that appears, you’ will see the list of all recipes in the cloud.
3. Click the required recipe label to view the following recipe details, along with the recipe step information:

   - **Label** - recipe label
   - **Description** - recipe description
   - **Unix compatible** - whether the recipe is compatible with Unix virtual servers
   - **Windows compatible** - whether the recipe is compatible with Windows virtual servers
   - **Recipe steps along with their details:**
     - **Script** - step code
     - **Result source** - step result source
     - **Pass values** - specify the pass output value, for example, 0
     - **On success** - recipe behavior on success
     - **Fail values** - specify the pass output value
     - **On failure** - the recipe behaviour on failure

### 10.5 Create Recipe

#### 10.5.1 Create recipe

To create a recipe:

1. Go to your Control Panel > **Cloud > Recipes** menu.
2. Click the "+" button.
3. Fill in the recipe creation form:

   **Properties**

   * **Label** - give your recipe a label
   * **Description** - provide a short recipe description (optional)
   * **Unix compatible** - move this slider to the right to use this recipe for Unix virtual servers.
   * **Windows compatible** - move this slider to the right to use this recipe for Windows virtual servers.

   For Windows compatible recipe, specify the script type. You can select the following script types:
4. Click Save. After that, you'll be redirected to the recipe details screen where you can add steps to this recipe.

10.5.2 Create steps

To create new recipe step:
1. Click the "+" button in the upper right corner of the Steps screen.
2. In the pop-up window that appears, specify step details as required:

   - Script - input the recipe code.
   - Result source - specify the step result source:
     - Exit code - an exit code, for example, 0 is the default value returned on success.

   To use exit code in the VBS or PowerShell scripts, you have to specify it directly in the script. For example:

   **VBS**
   
   Script:
   
   ```wscript
echo "test"
WScript.Quit 95
```

   **PowerShell**
   
   Script:
   ```powershell
get-date -displayhint date
exit 227
```

   - STDOUT - standard output.
   - STDERR - standard error
   - STDOUT and STDERR - standard output and standard error.

   - Pass values - specify the pass output value, for example, 0.

   You can not specify both pass and fail values for one recipe step.
   You can specify multiple recipe values. In this case you have to specify each value from a new line.

   - On success - the recipe behavior on success:
     - Proceed - proceed to the next step.
     - Fail - terminate the recipe and mark it as failed.
     - Stop - terminate the recipe and mark it as successful.
Go to step - specify the step to proceed to. If you specify the nonexistent step, the recipe will be stopped.

On failure
Specify the recipe behavior on failure.
In case you have already specified the recipe pass value, leave these fields empty and tick the Anything Else checkbox.

You can specify multiple recipe values. In this case you have to specify each value from a new line.

Pass values - specify the pass output value.
On failure - the recipe behaviour on failure
  o Proceed - proceed to the next step.
  o Fail - terminate the recipe and mark it as failed.
  o Stop - terminate the recipe and mark it as successful.
  o Go to step - specify the step to proceed to. If you specify the nonexistent step, the recipe will be stopped.

3. Press Save.

Drag and drop steps to change their order. To do so:
1. Select the required step and hold it down with the left mouse button.
2. Drag the recipe up to the required position and release the mouse button to drop it.
10.6 Edit Recipe

To adjust recipe details:

1. Go to your Control Panel > Cloud > Recipes menu.
2. Click the label of a recipe you want to edit, then click the Edit icon. You can edit the following recipe details:
   
   - **Label** - recipe label
   - **Description** - recipe description
   - **Unix compatible** - move this slider to the right to use this recipe for Unix virtual servers
   - **Windows compatible** - move this slider to the right to use this recipe for Windows virtual servers
3. Click the **Save** button to save your changes.

To edit recipe step, click the edit icon next to the required step, then change its details as required. Refer to the Edit Recipe Step section for details.

10.7 Edit Recipe Step

To edit recipe steps:

1. Go to your Control Panel > Cloud > Recipes menu.
2. Click the **Actions** icon next to the recipe you want to change, then click the **Edit** button.
3. On the screen that appears, you'll see the list of recipe steps. Click the **Edit** icon next to the step you want to edit.
4. In the pop-up window that appears, edit the step details as required:
   
   - **Script** - input the recipe code.
   - **Result source** - specify the step result source:
     
     - Exit code - an exit code, for example, 0 is the default value returned on success.
     - STDOUT - standard output.
     - STDERR - standard error.
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- STDOUT and STDERR - standard output and standard error.

Pass values - specify the pass output value, for example, 0.

You can not specify both pass and fail values for one recipe step.
You can specify multiple recipe values. In this case you have to specify each value from a new line.

On success - the recipe behavior on success:
  - Proceed - proceed to the next step.
  - Fail - terminate the recipe and mark it as failed.
  - Stop - terminate the recipe and mark it as successful.
  - Go to step - specify the step to proceed to. If you specify the nonexistent step, the recipe will be stopped.

On failure
Specify the recipe behavior on failure.
In case you have already specified the recipe pass value, leave these fields empty and tick the Anything Else checkbox.

You can specify multiple recipe values. In this case you have to specify each value from a new line.

Pass values - specify the pass output value.
On failure - the recipe behaviour on failure:
  - Proceed - proceed to the next step.
  - Fail - terminate the recipe and mark it as failed.
  - Stop - terminate the recipe and mark it as successful.
  - Go to step - specify the step to proceed to. If you specify the nonexistent step, the recipe will be stopped.

5. Press Save.

Drag and drop steps to change their order. To do so:
1. Select the required step and hold it down with the left mouse button.
2. Drag the recipe up to the required position and release the mouse button to drop it.
10.8 Delete Recipe

To delete a recipe:
1. Go to your Control Panel > Cloud > Recipes menu.
2. Click the Delete icon next to the recipe you want to remove.
3. Confirm the deletion.

10.9 Recipe Permissions

You can control user access to recipes functionality by giving different user roles certain permissions. The list below includes all the recipe permissions that can be set up in OnApp.

**Recipes**
- *Any actions on recipes* (recipes) - the user can take any action on recipes
- *Create new recipes* (recipes.create) - the user can create a new recipe
- *Delete any recipe* (recipes.delete) - the user can delete any recipe
- *Delete own recipes* (recipes.delete.own) - the user can delete own recipes
- *Edit any recipe* (recipes.edit) - the user can edit any recipe
- *Edit own recipes* (recipes.edit.own) - the user can edit own recipes
- *Read any recipe* (recipes.read) - the user can view all recipes
- *Read own recipes* (recipes.read.own) - the user can view own recipes

**Control Panel**
- *Add recipe to control panel* (control_panel.recipe_add) - the user can add recipes to the control panel
- *Remove recipe from control panel* (control_panel.recipe_delete) - the user can remove recipes from the control panel

**compute resource Zones**
- *Add recipe to compute zone* (compute_resource_zones.recipe_add) - the user can add recipes to compute zone
- *Remove recipe from compute zone* (compute_resource_zones.recipe_delete) - the user can remove recipes from compute zone

**Virtual Servers**
- *Add recipe to virtual machine* (virtual_machines.recipe_add) - the user can detach recipes from own virtual servers
- *Remove recipe from virtual machine* (virtual_machines.recipe_delete) - the user can detach recipes from all virtual servers
Smart Servers
- *Add recipe to any smart server* (smart_servers.recipe_add) - the user can add recipes to any smart servers
- *Add recipe to own smart server* (smart_servers.recipe_add.own) - the user can add recipes to own smart servers
- *Remove recipe from any smart server* (smart_servers.recipe_delete) - the user can remove recipes from any smart servers
- *Remove recipe from own smart server* (smart_servers.recipe_delete.own) - the user can remove recipes from own smart servers

Baremetal Servers
- *Add recipe to any baremetal server* (baremetal_servers.recipe_add) - the user can add recipes to any baremetal servers
- *Add recipe to own baremetal server* (baremetal_servers.recipe_add.own) - the user can add recipes to own baremetal servers
- *Remove recipe from any baremetal server* (baremetal_servers.recipe_delete) - the user can remove recipes from any baremetal servers
- *Remove recipe from own baremetal server* (baremetal_servers.recipe_delete.own) - the user can remove recipes from own baremetal servers

Templates
- *Add recipe to any template* (templates.recipe_add) - the user can add recipe to any template
- *Add recipe to own templates* (templates.recipe_add.own) - the user can add recipes to own templates
- *Remove recipe from any template* (templates.recipe_delete) - the user can remove recipes from any template
- *Remove recipe from own templates* (templates.recipe_delete.own) - the user can remove recipes from own templates

10.10 Recipe Groups

Recipe groups allow OnApp administrators to organize individual recipes into groups that can be used as a bucket resource. This allows you to easily create groups of recipes which can be added to the bucket to limit the recipes that are available to a user.

The recipe groups have hierarchical (tree) structure:
- Recipe group
- Child group
- Recipes

You can also add a recipe directly to the recipe group section without assigning it to a child group.

Click the recipe group's label to expand the list of child groups, then click the recipe group's label to view the list of recipes, respectively.

**To view the list of recipe groups:**
1. Go to your Control Panel's *Recipes >Recipe Groups* menu.
2. On the page that follows, you will see the list of all recipe groups.
3. Click the arrow next to the recipe group to expand the list of child groups and assigned recipes.

**To edit a recipe group:**
1. Go to your Control Panel's **Recipes > Recipe Groups** menu.
2. On the page that follows, you'll see the list of all recipe groups created within your cloud.
3. Click the **Edit** icon next to a group to edit its name.
4. Click the **Save** button to save your changes.

**To delete a recipe group:**
1. Go to your Control Panel's **Recipes > Recipe Groups** menu.
2. On the page that follows, you'll see the list of all recipe groups created within your cloud.
3. Click the **Delete** icon next to the required group to remove it.
4. Confirm the deletion.

**To add a recipe group:**
1. Go to your Control Panel's **Recipes > Recipe Groups** menu.
2. On the page that follows, click the "+" button.
3. Give a name to your group.
4. Click **Save**.
5. On the page that appears, you'll be prompted to assign a recipe to a group.

**To add a child group to a recipe group:**
1. Go to your Control Panel's **Recipe Groups** menu.
2. Click the "+" button next to the required group's label, then select **Add Child**.
3. Give a name to your child group.
4. Click the **Save** button to confirm.

**To assign a recipe to a recipe group:**
1. Go to your Control Panel's **Recipe Groups** menu.
2. Click the "+" button next to the required group's or child group's label, then select **Add Recipe**.
3. Choose the required recipe from the drop-down menu.
4. Click the **Save** button to confirm.

**To remove a recipe from a recipe group:**
1. Go to your Control Panel's **Recipe Groups** menu.
2. Click the arrow button next to the required recipe group to expand the list of recipes.
3. Click the **Delete** icon next to a required recipe.
4. Confirm the deletion.

### 10.11 Recipe Use Examples

The set of examples aimed to illustrate the recipe utilization.
10.11.1 Recipe 1

Runs on VSs for Apache server installation and default web page configuration. Can be used for the following events:

- VS provisioning (starts Apache server during the VS creation)
- Network rebuild
- Network interface added

Consists of 5 steps. Each step depends on the previous step result.

**Step 1**

```bash
#if echo $OPERATING_SYSTEM_DISTRO |grep rhel ; then
    if rpm -qa |grep httpd |grep -v grep ; then
        yum -y update httpd
    else
        yum -y install httpd
    fi
#else
    # exit 1
    #fi
```

*Result source: Exit code*

*Pass values: 0*

*On success: Proceed*

*Fail values: Fail anything else*

*On failure: Fail*

**Step 2**

```bash
echo "<p><a href=http://$CP_ADDRESS>OnApp Cloud</a></p>" />
/var/www/html/index.html
```

*Result source: Exit code*

*Pass values: 0*

*On success: Go to step 5*

*Fail values: Fail anything else*

*On failure: Go to step 4*

**Step 3**

```bash
service httpd restart
```

*Result source: Exit code*

*Pass values: 0*

*On success: Stop*
Fail values: Fail anything else
On failure: Fail

Step 4

```bash
echo "Can not write to file" > /var/log/recipes.log
```

Result source: Exit code
Pass values: 0
On success: Stop
Fail values: Fail anything else
On failure: Fail

Step 5

```bash
```

Result source: Exit code
Pass values: 0
On success: Go to step 3
Fail values: Fail anything else
On failure: Go to step 4

10.11.2 Recipe 2

Runs on compute resources to check the virtualization type.
Can be used for the following events:
- When Xen/KVM compute resource goes online

Step 1

```bash
if rpm -qa |grep -q $qayd ; then
    ps aux |grep -q xend || exit 1
else
    ps aux |grep libvirtd || exit 1
fi
```

Result source: Exit code
Pass values: 0
On success: Proceed
Fail values: Fail anything else
On failure: Fail

10.11.3 Recipe 3
Runs on compute resources to check the snmpd and snmpdtrap services and restarts them.
Can be used for compute resource and control panel server events.

**Step 1**

```bash
service snmpd restart && service snmpdtrapd restart
```

Result source: Exit code
Pass values: 0
On success: Proceed
Fail values: Fail anything else
On failure: Fail

10.11.4 Recipe 4
Runs on Windows virtual servers to check if the Apache folder is present and deletes it, otherwise installs Apache.
Can be used for Windows virtual server events.

**Step 1**

```bash
$files = dir 'C:\Program Files (x86)\Apache*' $process = "ApacheMonitor*"
if ($files -ne $null)
{
    "there's installed apache. Removing apache ..."
    $installer = dir 'c:\apache.msi'
    Stop-Process -Name $process
    Start-Sleep -Second 5
    Remove-Item $files -Force -Recurse
    Remove-Item $installer -Force -Recurse
    $files = dir 'C:\Program Files (x86)\Apache*'    if ($files -ne $null)
    {
        "Failed to remove apache"
        return 1
    }    else
    {
        "apache has been removed"
        return 0
    }
}    else
{
    "Apache has not been installed."
    "Downloading installer..."
```
"silence apache installation.."
c:\apache.msi /quiet

return 0
}

**Result source:** Exit code

**Pass values:** 0

**On success:** Proceed

**Fail values:** Fail anything else

**On failure:** Fail
11 AWS

OnApp implements the possibility to manage Amazon EC2 instances from OnApp Control Panel using AWS API. EC2 management is represented with as much similarity to AWS as possible. The following sections provide the details on how to manage AWS and Amazon EC2 instances in CP.

11.1 Enable/disable AWS

Amazon EC2 support is an opt-in feature that is available for a small additional fee on top of your normal OnApp license. Please contact your account manager before enabling Amazon EC2 support.

To enable AWS for your cloud, follow the procedure below:

1. Go to your OnApp Control Panel Admin > Settings > Configuration and switch on the Allow users connect to AWS toggle. This will enable AWS for the cloud.

2. Go to the Users and Groups menu and click the name of the appropriate user.

3. Find Amazon Web Services and click Connect.

4. To connect, provide the following credentials:
   - AWS access key - go to your Amazon profile > Security credentials > Users > Manage
   - AWS secret access key - use the same path as above. For security reasons AWS secret access key is stored encrypted in the OnApp DB.

5. In the left navigation pane of your Control Panel a new entry AWS > EC2 instances will appear.

If AWS is disabled - either for the cloud or for the user - the above option will disappear from the dashboard, but all users' credentials will be kept in OnApp DB.
11.2 View EC2 Instance

The EC2 Instances menu lists your machines per selected region and lets you Launch New EC2.

OnApp does not cash, store, or change any information regarding the instances and takes it via API from AWS.

To view the details of your EC2 Instances:

1. Go to your Control Panel EC2 Instances menu.
2. The page that loads will list your EC2 instances and the following details:
   - ID
   - Name
   - Instance type
   - Availability zone
   - Status
   - Public DNS name
   - Public IP address
3. You can perform the following actions to your instances:
   - Start/Stop
   - Terminate (only if stopped)
   - Reboot
   - Connect - instruction how to connect to a console of the instance.

The instances are listed per region, so if you do not have instances in the selected region the list will be empty.
11.3 Launch New EC2

Launching a new instance is a process similar to creation of a new virtual server.

To launch a new instance:

1. Go to your Control Panel EC2 instances menu.
2. Click the “+” icon or click Launch EC2 Instance at the bottom of the list.
   This step initiates a wizard which will guide you through the EC2 instance launch.

11.3.1 AMI(s)

Select the AMI template from your list or search the marketplace. The right panel lists the main AMI’s properties.

You may search using one or more key words or using the AMI ID. Please note, that search timeout is 30 seconds. If your request times out - try shortening the search time by making it more specific.

11.3.2 Instance Type

Select the instance type. It must be compatible with the AMI. If not - a corresponding error message will be displayed after the EC2 instance creation wizard completes.

11.3.3 Instance Details

On this step you need to fill in the following information:

- Indicate the number of instances to be launched. You may launch several identical instances at the same time.
- Specify network configuration. Choose network and subnet.
11.3.4 Review and Launch

On this step you can see the information on the EC2 instance you are going to create. You can either initialize the EC2 instance creation process or click the Previous button to change the required details of the instance.

3. Click **Launch EC2 Instance** button.

Some of the templates from the marketplace are not free of charge and require a subscription at AWS. Unfortunately this information cannot be obtained via API in the process of AMI selection. So, in case a paid AMI is selected, an error message will be displayed, requesting you to accept the terms and conditions and subscribe to the selected AMI at the Amazon website.
12 Users

OnApp provides very fine control over cloud users and what they’re allowed to do. You can set up as many different types of users as you need, and customize their access to cloud resources and Control Panel functions as required.

For example, standard, VIP and reseller users can have different capabilities and resource limits. You might provide basic cloud management functionality to L1 support staff (e.g. reboot virtual servers but not destroy them) while your L3 admins have full rights. Your development teams will probably need to deploy test VSs in the cloud just as a customer would, only without being charged for them. Meanwhile, your billing staff need a “billing only” view with no access to customer resources.

This fine control is enabled by a combination of user accounts, roles, permissions, and buckets.

12.1 User Accounts

There are two types of accounts in OnApp: administrators and users. An administrator account is created automatically when OnApp is installed. Administrators have full access to the system, including managing virtual servers and compute resources, performing actions on templates and backups, and configuring data stores and networks. There can be several administrators in OnApp.

User accounts are created by administrators, and only have access to those actions which are specified by an administrator.

12.1.1 View Users

For a quick view of user account details, go to your Control Panel > Admin > Users menu. You’ll see a list of all user accounts in your cloud, along with their details:

- **Full name** – user's name and surname
- **Username** – user's screen name
- **User role** – the role set for the user
- **Usergroup** – the group to which the user is assigned
- **Status** – user’s status (active or deleted)

You can scroll through the list of users with the Previous/Next buttons at the bottom of the screen, as well as use search tool to search for a specific user.

Click the Actions button next to the required user to edit, suspend or delete them, view the list of whitelist IPs or login as user.

Click **Drop All Sessions** button to terminate all sessions.

Every user including you will be logged out.

To get the list of additional fields, click the User Additional Fields button.

To view detailed information about a user's account, click user's full name.
12.1.2 View User Account Details

To view account details of a particular user:

1. Go to your Control Panel Users menu.
2. On the screen that appears, click the full name of the user to view their account details.
3. The screen that appears will display the following user details:

   The user details screen that appears shows the following information:

**User details**

- **Avatar** - user’s avatar (This feature is available if the Use gravatar option is enabled).
- **Full name** - user’s name and surname.
- **Email** - user’s email.
- **Login** - user’s screen name.
- **User role** - the role set for the user.
- **User group** - the group to which the user is assigned.
- **Timezone** - time zone set for this user.
- **Locale** - locales set for this user.
- **System theme** - system theme set for this user.
- **Display infoboxes** - whether info boxes are displayed or not for this user.
- **Restore infoboxes** - click this button to display info boxes for the user.

**Amazon Web Services**

- **Status** - the status of the Amazon Web Services: disconnected or connected.

**API info**

- **API key** - click the Generate key button to generate a new API key.

**Billing Details**

- **Price per last hour** - shows the price for VSs, Load Balancers, and other resources charged for the previous hour.
- **Bucket** - the bucket this user is assigned to. Click the bucket label to see its details.
- **Outstanding amount** - the total amount of money owned by this user since it has been created, for all resources, minus the amount of Payments. The sum is displayed for the period since a user has been created until the last 24hrs.
- **Monthly fee** - a set monthly price for a bucket.
- **Total cost** - the sum of all used resources cost and virtual servers cost. This sum does not take into consideration the free limits for resources set in the bucket.
cost that takes into account the bucket's free limits is displayed in the Total cost with discount field.

- Payments - the total amount of payments made.
- Discount due to free - the price of the resources that were created within the bucket's free limits. This sum will be subtracted from the Total cost.
- Total cost with discount - the price of used resources that excludes the cost of the resources that were created within the bucket's free limits.
- Virtual Server Hourly Statistic - clicking this link will generate billing statistics for all virtual servers owned by this user. For more information, see Virtual Server Billing Statistics.
- User Statistic - clicking this link will generate user's resource usage statistics. For more information, see User Billing Statistics.
- Monthly Bills - clicking this link will generate the bills list that shows the total due per each month of the year. To view billing statistics, select a year from the drop-down list and click Apply. The list that appears displays a particular month of the selected year and the cost of used resources for that month. At the bottom of the list there is the total amount of money which was to be paid for the selected period.

Prices
The list of all used resources and their price per hour for two states: server powered ON and server powered OFF. The prices in this section do not take into consideration the free limits for resources set in the bucket.

Servers
Shows the list of all virtual servers, load balancers, edge servers, smart servers, application servers in the cloud with their prices for server on and off. The prices in this section do not take into consideration the free limits for resources set in the bucket.

Backups
The prices in this section do not take into consideration the free limits for resources set in the bucket.

- Backups Count - the price per hour for the quantity of the user's backups.
- Templates Count - the price per hour for the quantity of the user's templates.
- ISOs Count - the price per hour for the quantity of the user's ISOs.
- OVAs Count - the price per hour for the quantity of the user's OVAs.
- Templates, ISOs & Backups Disk Size - the price per hour for the disk space user's ISOs/OVAs/backups/templates occupy.
- Autoscaling Monitor Fee - the price per hour for autoscaling monitors.
- Backup Server Groups - the price per hour for the resources consumed by backup server groups.

12.1.3 User Payments
To view payments for a user:
1. Go to your Control Panel > Admin > Users menu.
2. Click the name of the required user.
3. On the screen that appears, click **Payments** tab. The page that oads shows the list of all users’ payments.

**12.1.4 User Billing Statistics**

The system has a record of all the billing statistics on a user account for the last three months. If the account was created less than three months ago, statistics are generated for the actual period. You can also define a shorter period by setting **Start** and **End** time.

To view billing statistics for an account:

1. Go to your Control Panel > **Admin** > **Users** menu.
2. You’ll see a list of all user accounts in your cloud. Click a name of the appropriate user.
3. Go to **Billing Details** and click the **User Statistic** button.
4. You can filter the statistics by date and time - select the time period from the drop-down menu and click the **Apply** button. By default the statistics are generated for the last three months or the actual account existence period. On the page that appears:

- **Daily Stats** – particular date and time for the generated statistics.
- **Backups cost** - the price for the backups taken by the user during the chosen period.
- **Autoscaling monitor Fee** - the price for using the autoscaling monitor during the selected period.
- **Storage Disks Size Costs** - the price for the storage disk size for the predefined period.
- **Templates Costs** - the price for the templates made by the user during the chosen period.
- **Backup Zones Backups Cost** - the price for the backups of the backup zones taken during the selected period.
- **Backup Zones Backup Disk Size Cost** - the price for the backup disk size of backup zones during the predefined period.
- **Backup Zones Templates Cost** - the price for the templates of the backup zones made during the chosen period.
- **Backup Zones Template Disk Size Cost** - the price for the template disk size of backup zones during the predefined period.
- **Customer Network Cost** - the price for all customer networks for the selected period.
• **CDN Edge Group Costs** - the price for all CDN Edge groups for the chosen period.
• **Virtual Servers cost** – the total due for all the VSs minus Backups/Templates Cost (if any)
• **Total cost** – the sum of Used resources cost and Virtual Servers cost

**User Statistics:**
- **Resources cost** – the money owed per virtual server for the following resources:
  - CPU
  - CPU Priority
  - Disk Size
  - Memory
  - IP Address
  - Virtual Server
  - Template&Backup Storage
  - Disk size
  - IP Address
- **Usage cost** – the money owed per virtual server for the following resource usage:
  - Data read/written
  - Input/Output requests
  - Port speed
  - Data received
  - Data sent

• **Total** – the total due per virtual server for Resources and Usage cost.

12.1.4.1 Save as CSV
You can save your billing statistics to a file in a CSV format. To download a CSV file with billing statistics for a selected period of time, click the **Save as CSV** button. The download will start automatically after you click the button.

The CSV file includes the following information:
- **stat_time** - a particular hour for which the statistics were generated
- **vs_id** - an ID of a virtual server
- **resource_category** - a resource for which the statistics were generated. The resource category can be a `disk`, `network_interface`, `compute`, `template`, `instance_package`, and `service_add_on`.
- **resource_id** - an ID of a resource
- **metric_name** - a name of a metric for which the statistics were generated. The metric can be a `disk_size`, `data_read`, `data_written`, `reads_completed`, `writes_completed`, `ip_addresses`, `rate`, `data_received`, `data_sent`, `cpu_shares`, `cpus`, `memory`, `cpu_usage`, `template`, `count` (for instance packages, templates, and service add-ons), etc.
- **usage** - the amount of used resources that can be the following:
  - GBs of disk size, Kbs of data read/written, the number of reads/writes.
  - The number of IPs, the port speed in Mb per second, the data sent and received in KBs.
  - The count for the instance package, template, and service add-on categories.
- **cost** - the total due for the VS usage for a particular hour specified in the **stat_time** field
For virtual servers created from instance packages, the resource category is `instance_package`, the metric name is `count` and the usage is "1".

12.1.5 Edit User
To edit a user account:
1. Go to your Control Panel > Admin > Users menu. You'll see a list of all users accounts in your cloud.
2. Click the Edit icon next to the user you want to edit.
3. Change their details as required on the screen that appears.
4. Click the Save button to finish.

12.1.6 View User Backups
Backups in OnApp clouds are associated with user accounts. To view backups of a particular user:
1. Go to your Control Panel > Admin > Users menu.
2. You'll see a list of all user accounts in the cloud. Click the name of a required user.
3. On the User Details screen, click Backups tab.
4. On the screen that appears, you'll see the list of backups that belong to this user along with their details:

- date when the backup was taken
- target
- status
- backup size
- initiated
- backup server
- note
- virtual server
- customer
12.2 How to import an OVA with two disks

Currently importing an OVA with two disks is unsupported action in OnApp. The workaround is the following:

1. Import OVA archive as Others. Selected operating system should be Others, not Linux.
2. Create VM from this OVA template but don’t boot Virtual Server after build at this stage.
3. Create second disk through onapp WEB-UI. Disk size must be the same as the disk size of second vmdk. If you don’t know disk size, you can use vmdkinfo. In my example it is 30G

   Code Block 1 Example

   ```
   vmdkinfo /onapp/templates/xubrsgibnkoeqk/OVA-disk2.vmdk
   vmdkinfo 20160911
   VMware Virtual Disk (VMDK) information:
   Disk type: Stream optimized
   Media size: 30 GiB (32212254720 bytes)
   Content identifier: 0xd068d313
   Parent content identifier: 0xffffffff
   Number of extents: 1
   ```

4. Then, we need to run similar commands that are used for transaction BuildDisk (from step 2)
5. Activate second disk on backup server. In this example case /dev/onapp-rx24cizgevezjp/l2cf9ajcd9p5a8 is second disk created on step 3. You can take its details from the log of transaction.

   Code Block 2 Activate disk

   ```
   lvchange -ay /dev/onapp-rx24cizgevezjp/l2cf9ajcd9p5a8
   ```


   ```
   qemu-img convert -f vmdk -O raw -p
   /onapp/templates/xubrsgibnkoeqk/OVA-disk2.vmdk /dev/onapp-rx24cizgevezjp/l2cf9ajcd9p5a8
   ```

7. Deactivate second disk on backup server

   Code Block 3 Deactivate disk

   ```
   lvchange -an /dev/onapp-rx24cizgevezjp/l2cf9ajcd9p5a8
   ```

8. Start up VM
13 Groups

You can assign users into different user groups, so you can give different groups of users different cloud experiences. At present you can assign a UI theme to specific user groups (Admin > Settings > Look&Feel).

13.1 Assign New User to Group

This happens on the Add New User screen, as a part of the user creation process:
1. Go to your Control Panel > Admin > Users menu.
2. Click the Create User button.
3. Select the User group for the user from the user group drop-down menu.
4. Complete the other user detail fields, and click the Save button.

13.2 Change User Group for User

You can change the group a user is assigned to on the Edit User screen:
1. Go to your Control Panel > Admin > Users menu.
2. Click the Actions icon next to the user, then click Edit.
3. Select a user group for the user from the user group drop-down menu.
4. Click the Save button.

13.3 Create User Group

To add a user group:
1. Go to the Control Panel > Admin > Groups menu. The page that loads shows all the user groups in your cloud.
2. Click the + icon or the Create Group button.
3. At the Add a New User Group page, fill in the user group details:
   o Label - type the name for the user group
   o Buckets - select a bucket for the user group
   o Assign vCloud Roles - turn the switcher to the right to enable vCloud Director default roles for this group
   o Roles - assign role(s) that come with the appropriate Permissions set
   o User Buckets - specify the list of buckets that will be available for assignment to users within this user group. This parameter relates to restriction sets only.
4. Click Save to create the user group.
13.4 View/Edit/Delete User Group

To view, edit and delete a user group:

1. Go to your Control Panel > Admin > Groups menu.
2. Click a group's label to see all the users with their details assigned to the questioned group.
3. To edit user group details, click the Actions icon next to a user group you want to change, then click Edit.
4. To delete a user group, click the Actions button next to the user group you are interested in, then click Delete.
14 Logs

OnApp logs all cloud management actions that take place on cloud resources, including virtual servers, disks, data stores, compute resources, templates, and networks.

To access and manage logs, click the Control Panel > Admin > Logs menu where you can view the log of all transactions in the cloud. The Activity Log table provides the following details:

- **Icon** that indicates the status of an action
- **Ref** number that you can click to view details of a specific transaction
- **Date** when the action was performed
- **Action** name
- **Target** cloud resource with an identification number that you can click to view its details

You can view details on target cloud resources that are displayed in bold, indicating that they are available in the cloud. You cannot view details on resources that are unavailable, for example, resources that failed to be created.

- **Dependent** action's ref number that you can click to view its details

At the Logs page, you can click:

- **Hide Successful Market Notifications** to remove from the list actions that were performed successfully. Click this button again to show the full list.
- **Complete, Running, Failed**, or **Cancelled** to filter logs by their status
- **Clean Logs** to clear the logs completely
- **Cancel All Pending Tasks** to cancel all tasks scheduled for completion
- **Cancel All Pending Backups** to remove all pending backups

To search for a specific transaction, you can use the search box at the top.

You can also relegate "pending" transactions to the failed status. For this mouse over the pending status icon of a transaction and then click the cross sign that pops up.

Starting with OnApp version 4.0, users see transaction logs updated in real time. This is achieved by means of tail -f Unix command, which causes tail to not stop when the end of file is reached but rather to wait for additional data to be appended to the output.

To enhance readability, the following log items are pointed out with color and font size:

- Remote Server
- Fatal
• Executing Rollback
15 Statistics

Stats menu unites cloud usage and IOPS statistics generated by the OnApp Statistics receiver. The statistics receiver is an SNMP agent that collects data from host and guest systems and saves it in the round-robin database for the future processing. The collected data are then converted into hourly, daily, weekly and monthly statistics. The interval can be changed in the application configuration file.

Hourly statistics are stored in the database for the last 2 months.
Daily statistics are stored for 12 months.
Old statistics data are stored as a monthly statistics (12 months, respectively).

The Usage Statistics screen lists every virtual machine in the cloud, along with their details:

- **Owner** - the owner's username.
- **CPU used** - the average CPU percentage that the VS has been using during the last 72 hours or during the specified period.
- **Disk reads completed** - the number of read operations performed by the disk.
- **Disk writes completed** - the number of write operations performed by the disk.
- **Disk data read** - the amount of data read from a disk.
- **Disk data written** - the amount of data written to a disk.
- **Bandwidth sent** - the number of Kilobytes (KB) sent by this VS.
- **Bandwidth received** - the number of Kilobytes (KB) received by this VS.

By default, statistics are generated for the last 72 hours. To specify another period, set the **Start** and **End** time and click the **Apply** button.

You can sort by all categories except the virtual server name: click a column label to sort in ascending order (you'll see an arrow appear to show how the data is being sorted). Click it again to sort in descending order.

You can also drill into a specific VS, or its owner, by clicking the relevant links in the list.

15.1 Cloud Usage

The Usage Statistics page lists each virtual server in your cloud, along with the following details:

- **Virtual Server** - the label the virtual server
- **Owner** - the username of the VS owner
- **CPU Used** - the average CPU percentage that the VS has been using during the last 48 hours or during the period you specified
- **Disk r/w Completed**
  - **Disk reads completed** - the number of read operations completed on the disk
  - **Disk writes completed** - the number of write operations completed on the disk
- **Disk r/w Data**
  - **Disk data read** - the amount of data read from the disk
  - **Disk data written** - the amount of data written to the disk
- **Bandwidth**
- **Bandwidth sent** - the number of Kilobytes (KB) sent by the VS
- **Bandwidth received** - the number of Kilobytes (KB) received by the VS

To sort statistics in the table, hover over the required column and click the label. The arrow that appears while hovering over the label shows the order (ascending/descending) in which the data is sorted. Click the label again to sort the data in the different order. You can also view details of a specific VS or its owner by clicking the corresponding links in the table.

By default, statistics are generated for the last 48 hours. To specify another period, set the **Start** and **End** time and click the **Apply** button.

When you specify hours for statistics generation, pay attention that statistics will be generated as follows:

- For a period of time where hours are specified without minutes, e.g. 15.00-17.00, the statistics will be generated for the specified period of time and the preceding hour, that is from 14.00 up to 17.00.
- For a period of time where hours are specified with minutes, e.g. 15.30-17.00, the statistics will be generated for the specified period of time, that is from 15.00 up to 17.00.

To download a CSV file with statistics for a selected period of time, click the **Save as CSV** button. The download will start automatically after you click the button.

### 15.2 Top IOPS disks

Top IOPS statistics chart displays 10 disks with top IOPS usage along with the following details:

- **Hostname** - hostname of a virtual server the disk is located at.
- **Disk** - disk ID.
- **Total IOPS** - total number of I/O operations per second.
- **IOPS Read** - number of read I/O operations per second.
- **IOPS Written** - number of written I/O operations per second.
16 Buckets

The Buckets menu provides the details of the bucket for which you are currently signed up.

To view the bucket details:
1. Go to your Control Panel's Buckets menu.
2. Click the bucket label.
3. The page that loads will show the following details:

- **Label** - your bucket name.
- **Monthly price** – a monthly price for the bucket. This price will be applied regardless of the actual prices for used resources.
- **Currency** - a currency you’re charged in.

Windows licensing support settings:
- **MAK licensing** - shows if the MAK licensing is enabled
- **KMS licensing** - shows if using KMS service is allowed
- **User license** - shows if inserting custom licenses is possible
17 Help

The help menu lets you submit support requests to the OnApp team. All OnApp customers with a full (paid) license are entitled to 24/7 support.

- Click the Help link in the Control Panel, and complete the form on the screen that follows.
- Alternatively you can call +1 (888) 876-8666, or use the OnApp support portal.